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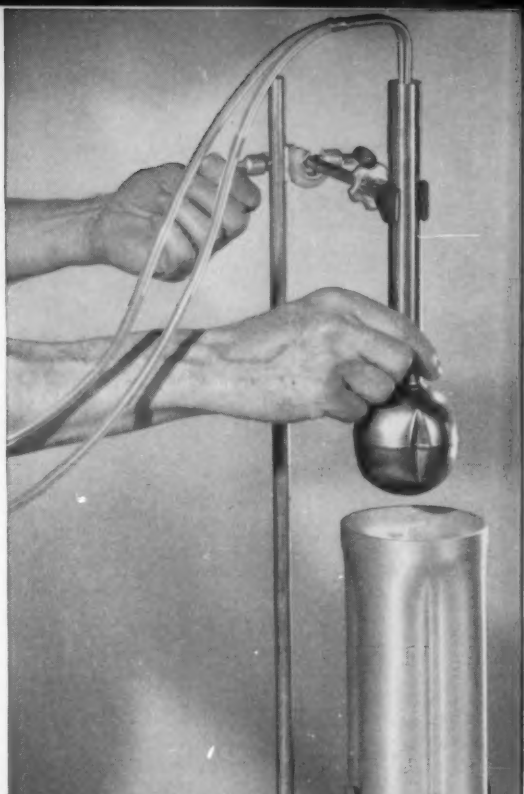

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A Half-Century of Quantum Physics

E. U. Condon

Consulting Physicist, 2938 Avalon Avenue, Berkeley 5, California

THE presidency of the American Association for the Advancement of Science is one of the greatest honors that American scientists can confer on one of their colleagues, and I am grateful for the opportunity to have served in this post. This is a particularly happy occasion* for me, for the setting is the auditorium in Wheeler Hall, where as an undergraduate I heard many a lecture, and this is the 30th anniversary of the awarding of my A.B. degree in physics by the University of California, our host institution for this meeting of the AAAS.

Before and during my undergraduate student days, I used to work this campus as a reporter for San Francisco and Oakland newspapers. Thus began a long and pleasurable acquaintance with the local chairman of our meeting, President Robert Gordon Sproul.

Of course I cannot talk to you entirely from first-hand knowledge of a half-century of quantum physics. I was born in Alamogordo, New Mexico, in 1902, which was 2 years after Max Planck introduced the quantum idea into physics in Germany. Aside from the fact that I was pretty young at the time, I do not think Planck's theory attracted much attention at the time in Alamogordo. Now, of course, my home town is quite conscious of atomic physics, and its chamber of commerce has placed signs on the highways leading into town which proclaim that the town is the birthplace of atomic energy. They refer, of course, to the fact that the first atomic bomb was exploded near here in the summer of 1945.

I first heard of physics when I was 12 years old and bought a high-school textbook by Carhart and Chute for 15 cents in the old DeWitt and Snelling bookstore in Oakland. The following year I became pretty deeply involved in what we now call the atomic age. I had been reading *The New Knowledge* by Robert Kennedy Duncan, which was a popular book on atoms and radioactivity by the man who founded the Mellon Institute for Industrial Research. That was in 1915, the year in which San Francisco celebrated the opening of the Panama Canal by holding the Panama Pacific International Exposition. Another boy and I discovered that the state of Colorado had as part of its exhibit a large pile of 10 or 20 tons of raw carnotite ore. This is a brilliant yellow sandstone, which today is being sought all over the mountain states by prospectors who rent their Geiger counters from local drugstores.

My friend and I managed, as boys will, to acquire enough carnotite from that pile to fill a shallow cigar box. With it we could take, using overnight exposures, shadow pictures of keys and other metal objects which were made by the gamma rays emitted by the radium and uranium content of the ore.

Once a boy of 13 has become this deeply involved with modern atomic physics, there is likely to be no hope that he is good for anything else. From then on it is impossibly hard for his teachers to get him interested in reading Gayley's *Classic Myths*.

Practically all the important progress in physics in this century is bound up with quantum ideas. Moreover, it has been a half-century in which physics has developed at a revolutionary pace that is totally unprecedented in the world's history. Therefore all that I can do here is to pass the main ideas in rapid review, perhaps lightening the story with an anecdote here and there, and hope to stimulate a wider interest in this exciting subject. Everything I say is well known to the physicists However, the ideas are complicated, and they may experience the academic delight of catching me in a mistake or two.

Quantum Ideas

By quantum physics we mean all parts of the science that involve a peculiar universal constant, known as Planck's constant, h, where

$$h = 6.55 \times 10^{-27} \text{ erg sec.}$$

So defined, quantum physics involves nearly all of physics and chemistry. It also involves a good share of astrophysics. Moreover, quantum ideas have required a good deal of searching into the philosophic foundations of physics.

The quantum idea was first introduced into physics in 1900 and 1901 by Max Planck in connection with the study of the radiations emitted by hot solid bodies. Throughout most of the 19th century, such radiation, including visible light, had been regarded as a wave motion. But, in developing the theory of radiation from hot bodies, Planck found it necessary to assume that light energy is not emitted and absorbed continuously by atoms. Rather he supposed that it was emitted and absorbed in definite little bundles of energy, or quanta.

Many experimental properties of light pointed to its being propagated as a wave motion. There is nothing remote or esoteric about these experiments. Take a silk umbrella and look through the fabric at a distant street light. In addition to a central white image, you will see a series of colored images extending out

* This paper is based on the address of the retiring president of the American Association for the Advancement of Science, at the annual meeting, 28 Dec. 1954, in Berkeley, Calif.

from the central image in two mutually perpendicular series in directions related to the warp and woof of the fabric. These are caused by interference of light waves which go through different interstices between the evenly spaced threads of the fabric.

A diffraction grating is an accurately made device for observing these spectra more accurately. By measuring the angle of spread between them and the central image, one can find the wavelength of the waves, and, by knowing the velocity of the waves, one can find the frequency or number of oscillations per second that occur as the wave passes a fixed point.

In this way, one finds that the wavelength for violet light is about 3×10^{-5} cm and that the wavelength for red light is about twice as great, or 6×10^{-5} cm. Thousands upon thousands of these wavelengths have been measured to at least 6 decimal places. These form the largest and most precise body of experimental data in all physics. Since the velocity of light is 3×10^{10} cm/sec, it turns out that the frequency of violet light is about 3×10^{14} cy/sec.

On Planck's view, light of frequency ν cy/sec is emitted and absorbed in quanta of energy equal to $h\nu$, which is therefore about 6.5×10^{-12} erg for violet light. For x-rays the frequencies are some 10,000 times greater, and the quanta are therefore some 10,000 times greater.

The reasoning that led to this result was so complicated that Planck himself was not fully convinced of its validity. Physicists are all an extremely conservative group of people, at least in matters having to do with their own science, and they were reluctant to accept the radical quantum idea on such slender evidence.

In 1905 Einstein showed how clearly and neatly the main facts regarding the photoelectric effect could be understood if the quantum view of light were favored over the wave view. In the photoelectric effect, electrons are emitted from a metal when light shines on it.

Early experiments showed that increasing the brightness of the light caused more electrons to be emitted but did not increase the energy of motion with which the emitted electrons came out. On the wave view, one would think that a bigger wave would shake the electrons harder and make them come out with more energy.

Experiment also showed that the energy with which the electrons were emitted increased linearly as the frequency of the light was increased. This result was not at all understood in terms of the wave theory of light.

Einstein pointed out that on the quantum view, if 1 light quantum goes to 1 electron, then greater brightness means more quanta and therefore more emitted electrons. Planck had already found it necessary to suppose the energy content of a quantum to be proportional to the frequency of the light wave, and thus a natural explanation is provided of why the energy of the emitted electrons increases linearly with the frequency.

Wave-Particle Duality

Thus was born the wave-particle duality or dilemma of modern physics. Light, on going through a series of closely spaced slits, behaves in ways that have found only quantitative explanation on the wave theory. Light, on falling on a metal, liberates electrons in ways that have found satisfactory explanation only in terms of the quantum or corpuscular theory. From here on, the subject began to develop at an ever-increasing rate.

When atoms are excited in a gaseous discharge tube, such as is used for advertising signs, the kinds of light emitted consist of sharply defined frequencies characteristic of the gas atoms in the discharge tube. If light is emitted in quanta of definite amounts, this must mean that the atoms are capable of existing only in states of definite energy values. The differences in these allowed, or quantized, energy values are the energies of the light quanta emitted by an atom in passing from a state of higher total energy to one of lower total energy. In 1913 Niels Bohr built his successful theory of the hydrogen atom on a combination of this quantum idea with the general picture of the nuclear atom that had been developed experimentally by Ernest Rutherford. Soon afterward, James Franck and Gustav Hertz performed experiments in which they showed the reality of these quantized energy levels in atoms by finding that electrons can give up quantized amounts of energy to atoms only on colliding with them, and that these quantized amounts are closely correlated with the sizes of the emitted light quanta.

In 1912 another discovery of major importance was made. Since the discovery of x-rays in 1896 by Wilhelm Roentgen, there had been speculation on whether these were a wave motion or a stream of corpuscles. Attempts at diffraction experiments gave negative results with a sensitivity indicating that, if they are a wave motion, the wavelength cannot be more than about 10^{-8} cm. This is just about the distance apart of layers of atoms in a crystal, which gave Max von Laue the idea that perhaps the regular arrangement of atoms in a crystal would diffract x-rays in the way that the rulings of a diffraction grating diffract light. The experiment was successful. Thus two new branches of physics were born. By use of a crystal of known structure, it was now possible to measure the wavelengths of the characteristic x-rays emitted by various atoms, so spectroscopy was extended to the x-ray region. By use of x-rays of known wavelength, it was possible to infer from the nature of the diffraction pattern how the atoms are arranged in crystals of unknown structure. Thus a powerful tool was provided for the study of the structure of solid matter.

All this served to point up the disturbing puzzle of the dilemma on whether x-rays and light were really a wave motion or really a stream of corpuscles, for it seemed to be something like both and yet no one could see how it was possible for it to be both in any sense.

Only W. H. Bragg, writing in *Nature* in late 1912, hinted at a combined outlook. He wrote:

> The problem then becomes, it seems to me, not to decide between the two theories of x-rays, but to find . . . one theory which possesses the capacities of both.

On Bohr's model of the atom, the electrons revolve around the nucleus like planets going around the sun in the solar system. Although the theory was immensely successful in correlating spectroscopic facts, it threw no light on the fundamental nature of the valence forces that hold atoms together in molecules. In Berkeley, G. N. Lewis developed a rival theory based on a static model of the atom in which electrons had favored locations at the corners of a series of cubes surrounding the nucleus, the eight corners corresponding to the length of the short periods in the periodic system of the elements.

When I entered the University of California as a freshman in 1921, the Bohr atom was being taught in the physics department and the Lewis atom was orthodox doctrine in the chemistry department. Now both departments are preaching the same kind of atom, which resembles neither of its forerunners and combines the best features of both. The things I am talking about are so old that if they are mentioned anywhere it is probably in the history department.

The early 1920's were an exciting time to be studying physics. We had these rival atomic theories, each with its inadequacies and uncertainties. Some things were lacking. In Livermore, California, there was only the rodeo and on Charter Hill nothing but the Big C and a few grazing cows.

In 1923 the wave-particle dilemma became even more acute. Arthur Compton, in St. Louis, discovered that x-ray quanta have momentum as well as energy. When x-rays are scattered by matter of light atoms, it is found that some of them are scattered, but that the scattered x-rays consist of smaller quanta than those which struck, and the shift toward smaller quanta is greater, the larger the angle of deflection through which the x-rays are scattered. All this was exactly in accord with the idea that the x-ray quanta were scattered by colliding with electrons by exactly the same rules of conservation of energy and momentum that are applicable to the collision of two material particles, such as billiard balls.

In that same year, 1923, Louis de Broglie in Paris published his now-famous doctor's thesis, in which he suggested that the wave-particle duality might extend to the behavior of electrons as well as to light and x-ray quanta. Up until this time physicists felt sure that a beam of cathode rays was simply a corpuscular stream of electrons moving in accordance with Newton's laws of motion, as corrected in the high-energy region for relativistic effects.

De Broglie suggested that the relationship between the wavelength of the wave aspect of an electron and the momentum of the particle aspect of the electron ought to be the same as that already found to hold for x-ray quanta, namely, that wavelength equals Planck's constant divided by momentum. This suggestion made possible a simple interpretation of the existence of discrete energy levels in atoms, which in Bohr's theory was simply postulated in order to get agreement with spectroscopic facts.

We are all familiar with the fact that a stretched string in a musical instrument vibrates freely at a particular frequency such that the length of the string is just equal to half a wavelength of the wave of that frequency which might travel on the string. Then it can vibrate also at double this frequency, so the length equals two half-wavelengths, or at triple the fundamental frequency so the string's length equals three half-wavelengths, and so on. Similar rules apply to the modes of vibration of other continuous bodies such as the stretched membrane of a drum. De Broglie argued by analogy that, if the motion of electrons was somehow governed by an associated wave motion, then the allowed orbits in an atom must be governed by mathematical restrictions similar to those which determine that vibrating bodies can vibrate only in a certain discrete set of modes of vibration.

It turns out, on these views, that the de Broglie wavelengths of electrons which have been accelerated by a potential drop of a few hundred volts will be of the same order as that of x-rays. This suggests that electrons, too, ought to show diffractive scattering by the regularly spaced layers of atoms in a crystal. In 1927 electron diffraction was discovered in New York by C. J. Davisson and L. H. Germer, working with the scattering of low-energy electrons by a single crystal of nickel, and independently that same year by G. P. Thomson in England, who worked with the scattering of higher energy electron beams by polycrystalline materials. These experiments fully confirmed the idea that electrons are scattered from crystals like a wave motion having the wavelength that was predicted by de Broglie. At the same time a new tool for crystallographic studies, supplementing that of x-ray diffraction, was made available.

A few years later it was shown experimentally that beams of hydrogen molecules and of helium atoms were also governed by de Broglie wave principles when scattered by crystals. This was done by Otto Stern, now a distinguished resident of Berkeley, who was then professor of physics in Hamburg, Germany.

In consequence of these experimental discoveries and many associated theoretical developments, physicists now believe that the wave-particle duality applies to all things in nature, be they light quanta, electrons, protons, or entire atoms and molecules. With larger things, the wavelength becomes so small that the wave aspect escapes observation, which is why all ordinary motions appear to be governed entirely by the particle formulation originating in Newton's laws of motion.

Matrix Mechanics

In 1925, Werner Heisenberg in Göttingen discovered a new mathematical way of treating prob-

lems in atomic physics. It was called matrix mechanics because quantities which in Newtonian mechanics are represented by ordinary numbers are represented in this theory by an abstract kind of mathematical entity known as a Hermitian matrix.

This theory caused physicists a lot of trouble. Up to then practically none of them had ever studied matrix algebra. It is true that the mathematicians knew about matrices but, under pressure from the physicists to teach them only what they needed to know, the mathematicians had not talked about matrices when physicists were around. Max Born, the 1954 Nobel prize winner in physics, was in Berkeley from Göttingen in 1925 as a visiting professor, and he lectured on matrix mechanics. What a rough time he gave us as we tried to grasp the strange new ideas of matrix mechanics.

Then, in the spring of 1926, what a relief it was when Erwin Schrödinger's rival wave mechanics came on the scene, and we could avoid the difficulties of matrix algebra. And what a surprise it was in the summer of 1926 when Carl Eckart, in Pasadena, and also Schrödinger himself discovered that the two theories were identically the same. They were simply dressed up in such totally different mathematical costumes that it took some time before their identity was recognized.

In the early fall of 1926 I left Berkeley to study the new quantum mechanics with Born in Göttingen. There the great mathematician, David Hilbert, used to delight to tell us how he had told the Göttingen theoretical physicists of the close relationship between matrix algebra and certain boundary value problems of differential equations. If they had followed up this lead they might have discovered wave mechanics before Schrödinger.

In those days Hilbert used to say, "Die Physik wird zu schwer für die Physikern"—physics is becoming too difficult for the physicists.

In 1927 the pace of discovery in theoretical physics was probably greater than in any other year in the history of the science. Every issue of the leading journals had at least one paper of great importance. There was the more general formulation of the laws of quantum mechanics that was made principally by P. A. M. Dirac in England and John von Neumann in Germany. There was the development of the quantum theory of the radiation field by Dirac and the relativistic form of the quantum theory of the electron, which led to the prediction of the existence of the positively charged electron or positron, that was discovered a few years later by Carl Anderson in Pasadena.

Arnold Sommerfeld laid the foundations for the whole modern theory of metals and semiconductors by applying the quantum mechanical methods to the treatment of the free electrons in a conductor. W. Heitler and F. London applied quantum mechanics to the theory of the covalent chemical bond between two hydrogen atoms and showed that this atomic theory could at last meet the needs of the chemists. This gave rise to a wide program of developments, which resulted in the award of the 1954 Nobel prize in chemistry to Linus Pauling of the California Institute of Technology.

Heisenberg showed how the new quantum theory could account for the extremely strong interactions between the electrons in iron, cobalt, and nickel, which give rise to the strong magnetic effects shown by these elements. Many other discoveries of great importance were made among which may be mentioned the final clarification of the low-temperature heat capacity of gaseous hydrogen. It had long been known that this had something to do with quantum restrictions on the rotation of hydrogen molecules, but David M. Dennison showed the solution of this problem leading to the discovery of two stable forms of hydrogen gas known as orthohydrogen and parahydrogen.

Things were happening at such a pace that all the physicists, young and old, were suffering from acute mental indigestion. In the spring of 1928 when I taught a course in quantum mechanics for the first time at Columbia University, I remember that the late Bergen Davis summed it all up by saying,

> I don't believe you young fellows understand it any better than I do—but you all stick together and say the same thing.

Statistical Theories

Going back a bit, it was in the fall of 1926 that Max Born took a decisive step in supplying the hypothesis that provided a general basis for interpretation of the mathematical formalism of quantum mechanics. We had a mathematics of wave motion that was somehow associated with the motion of the electrons or other atomic particles. The big question was What is the basic relationship between the associated wave motion and the behavior of the atomic particles?

Born's answer, which was largely the basis of the award of the 1954 Nobel prize in physics to him, was that the theory does not and cannot make precise predictions about the motion of the particles, but that it can make only predictions about the relative probability of appearances or motions of different kinds. In particular he postulated that the square of the amplitude of the de Broglie waves at a particular place gives the relative probability of finding a particle in that place. This is a radical and revolutionary idea in its implications, and fundamental disputes among physicists still rage regarding its basic meaning. Nevertheless, it must be realized that this idea of a statistical interpretation of the waves as describing probabilities of behavior of the particles has now stood the test of time for more than a quarter-century and lies at the foundation of all modern atomic physics.

Physical science got its start with the precise astronomical predictions resulting from the dynamical theory of the solar system. These many quantitatively verified results exercised a dominating influence on

physical thinking. All physics was assumed to be reducible to a fully deterministic description of motions, such that, given a full description of the situation as of now and sufficient calculating skill, one could calculate precisely what will happen at all times in the future.

Prior to 1926 statistical theories had been used in physics. Statistical methods were used to give an over-all average description of the heat motions that give rise to the thermal properties of matter. But in all such theories it was supposed that there really exists an underlying fully deterministic reality, and that statistical methods are used by choice for simpler descriptions rather than by fundamental necessity.

The questions now arise: Is there really an underlying fully deterministic description of the phenomena of atomic physics that has so far eluded our observations and theory-making because of some basic incompleteness that may be remedied in the future? Or, on the other hand, is there some inherent limitation in the world and our possible ways of observing it such that our knowledge of events is fundamentally restricted to observations and conclusions of a statistical character?

In the fall of 1927, Heisenberg provided an analysis of the processes of measurement that strongly favors an affirmative answer to the second question. Later analysis by Bohr in 1928 extended these ideas. The essence is that on an atomic scale the processes of observation necessarily introduce uncontrolled disturbances, and it is these which give rise to the overall uncertainties that make fully deterministic knowledge impossible. If one refrains from observing, he makes no disturbance but remains ignorant of the data needed for deterministic calculations. Observations can be arranged in ways that increase the precision of knowledge of one variable but only at the price of introducing more uncertainty into the knowledge of a complementary variable.

The analysis of Heisenberg and Bohr provides a deep insight into the nature of limitations on knowledge of deterministic behavior, which seem to be truly fundamental. Most physicists today accept these views and regard the statistical element of the theory as an intrinsic feature of the world in which we live. Classical determinism on this view is an ideal limit toward which our knowledge can approach in large-scale phenomena where the quantum limitations become unimportant corrections.

But one physicist of outstanding importance steadfastly thinks otherwise. He is Albert Einstein. At the very outset he expressed himself by saying "Der lieber Gott würfelt nicht." In American vernacular we would say "the good Lord doesn't shoot craps."

Born's book, *Natural Philosophy of Choice and Chance* quotes a letter Einstein wrote in 1947 in which he says, "the statistical interpretation . . . has a considerable content of truth." However, he goes on to say

> I am absolutely convinced that one will eventually arrive at a theory in which the objects connected by law are not probabilities, but conceived facts as one took for granted only a short time ago.

With characteristic modesty he concludes then by saying

> Zur Begründung deiser Überzeugung kann ich aber nicht logische Gründe, sondern nur meiner kleinen Finger als Zeuger beibringen, also keine Autorität, die ausserhalb mainer Haut irgendwlechen Respect einflössen kann. [I cannot provide logical arguments for my conviction but can only call on my little finger as witness, which cannot claim any authority to be respected outside my own skin.]

Whether all the data of experience can be codified in terms of fully deterministic relations I do not know, of course, but unquestionably it is useful to have such organization of knowledge carried to its furthest limits. The history of science is filled with facile generalizations and the kind of oversimplification that fails to qualify what would be true if properly qualified. Think of the many pages of disputatious writings on free will and determinism!

In my view physics has nothing to say on this one way or the other as an issue related to human conduct. It was an unwarranted extrapolation in the first place to pass from the planetary successes of classical mechanics to extreme mechanistic determinism for human actions. It is equally incorrect to argue from the statistical determinism of quantum mechanics any support for the idea of free will in human behavior.

Nuclear Physics

By 1927 the principles of quantum theory as we know them today were pretty well developed. In the 27 years since then the ideas of quantum physics have been so closely identified with all the progress that has been made in physics and chemistry that it is not possible to discuss quantum physics separately from progress as a whole in these sciences.

The entire theoretical structure of nuclear physics is cast in quantum mechanical terms. This new branch of physics has never been handled in any other way. The application of quantum mechanics to problems of the internal structure of the nucleus was initiated in 1928 with the discovery of the theory of alpha-particle radioactivity by George Gamow in Göttingen and independently by the late Ronald Gurney and myself in Princeton.

This theory provides one of the most extreme examples of the use of probability ideas. According to classical mechanics, it is not possible for a particle to be in places where its total energy is less than its potential energy. In quantum mechanics this impossibility is changed into an improbability. An alpha particle in a uranium nucleus collides with the wall surrounding the nucleus some 10^{20} times a second. According to quantum mechanics it has a very slight chance of getting through the wall, even though it does not have energy enough to get over it. This chance is extremely small, amounting to only about one chance in 10^{36}. In consequence, the alpha particle remains in the nucleus on an average about 10^{9}

years before the spontaneous disintegration occurs. Nevertheless, the statistical feature of the theory shows up in that some uranium atoms disintegrate in a very short time, whereas others have lasted for many thousands of years without disintegrating.

This same theory of barrier leakage applied in reverse indicated that light elements could be made to undergo artificial transmutations using particles accelerated with voltages much lower than had been estimated to be necessary. This gave a strong stimulus to the experimental investigation of nuclear reactions which began in the early 1930's.

Quantum mechanics has also provided the concept of saturable exchange forces between fundamental particles, an idea that is foreign to classical ideas but appears to be essential in the further development of the theory of nuclear structure. Relativistic quantum mechanics, as I have already mentioned, provided the prediction of the existence of the positron and provides the theoretical basis for calculations of many of the basic processes that occur in the region of high-energy physics—that is, the physics of particles having energies of several hundred million to billions of volts, a branch of physics that is extensively studied here in Berkeley.

From quantum mechanical theories concerning exchange forces between protons and neutrons, H. Yukawa in 1936 was led to postulate the existence of a hitherto undiscovered kind of particle, called the meson, intermediate in mass between the electron and the proton. Experiments in recent years have shown that there are in fact many kinds of mesons, with complicated interrelationships, whose study is today one of the most important topics in fundamental research in physics.

In spite of all these successes and many others too numerous to mention here, the record is not one of complete success. Very early in the modern period, namely in 1927, Dirac took the decisive steps toward the development of a quantum theory of the electromagnetic field and had a number of significant successes with the theory as he developed it. Heisenberg and W. Pauli extended the theory, and many others have worked on it.

This theory, or rather this family of theories, in various forms, however, suffers from a fatal defect that many of the important problems of physics have no solution. When the solution is carried out, they lead to divergent integrals that give infinity for a formal answer to a problem that ought to have a finite solution. A large amount of study has gone into efforts to remove this difficulty but with little success. Therefore the quantum theory of the electromagnetic field remains today in an unsatisfactory state. Probably the difficulties can be overcome only by some radical revision of the fundamental ideas that is as revolutionary in its nature as the ideas of the present theory seemed when they were first developed in 1927.

The past half-century has been an exciting period of enormous fruitfulness in the development of physics and chemistry. Today a greater effort, measured both by adequacy of the equipment and numbers of well-trained men, is going into the investigation of the fundamental nature of matter than ever before in the world's history. We may expect therefore that the next 50 years will bring a development of our knowledge and our ideas that is even greater than has occurred in the first half of the present century. If this happens, the physics of the year 2000 will be as strange and unforeseeable by us today as the physics of today would have seemed to the physicists of 1900.

Some scientists regard an interest in the history of their subject as mere antiquarianism, and it may be that the very remote past consists largely of mistakes to be avoided. But it deserves to be remembered that the history of any scientific discipline intimately determines the current modes of investigation. The frames of reference which appear eligible at any given epoch, the instruments accepted as respectable, and the types of "fact" taken to have evidential value are historically conditioned. To pretend otherwise is to claim for human reason, as manifested in scientific progress, a universality and fixity it has never manifested.—MAX BLACK, "The Definition of Scientific Method," *Science and Civilization*, Edited by Robert C. Stauffer (The University of Wisconsin Press, Madison, 1949).

Paul B. Sears

Edmund W. Sinnott

Yale University, New Haven, Connecticut

THE new president-elect of the American Association for the Advancement of Science, Paul Bigelow Sears, is a botanist by profession, but a botanist whose interests extend over a much wider field than the plant kingdom. His concern with plant ecology and the relationships between plants and their environment led him early to an interest in the relationships between plants and man's affairs and thus to an interest in the wide problems of conservation, of man's stewardship of the earth's resources, a field in which he is one of the most distinguished students and spokesmen. Paul Sears is a biological statesman, one of the group of men—all too few—who know the life sciences well but see them against the wide background of human affairs.

[Yale University News Bureau]

The new president-elect was born in Bucyrus, Ohio, on 17 Dec. 1891. He took his bachelor's degree at Ohio Wesleyan University in 1913 and his master's degree 2 years later at the University of Nebraska. His later graduate work was done at the University of Chicago, from which he received the doctorate in 1922. In 1915 he was appointed to the botanical staff of Ohio State University. After service in World War I he went to the University of Nebraska where he was assistant professor and associate professor of botany from 1919 to 1927. He then was appointed professor of botany and head of the department at the University of Oklahoma, serving there until 1938, when he returned to Ohio, where until 1950 he was chairman of the department of botany at Oberlin College. In 1950 he came to Yale as professor of botany and chairman of the newly established program in conservation, through which he has a wide influence on the whole conservation movement. He has been honored by election to membership in many organizations and various calls to civic duty.

Through the years Sears' interest in plant ecology kept leading him into human ecology as well. As a young man he did pioneer work on the native vegetation of Ohio, with particular reference to the profound changes in it that followed the coming of the white man. His close experience with the dust bowl in Oklahoma during the great drought of the 1930's led to the writing of his widely read book *Deserts on the March*. He became more and more closely concerned with the conservation movement, particularly as it related to agriculture, and brought to it not only a mind trained in biology but a wide practical knowledge of agriculture and a sanity of judgment that have made him preeminent in this great field. To these qualities Sears adds a facility and charm both in speaking and writing that have extended his influence widely. In addition to several other nontechnical books—*This Is Our World, Life and Environment*, and *Charles Darwin, the Naturalist as a Cultural Force*—he has written more than 100 papers of general interest which cover a wide spectrum of topics.

Sears has also had a distinguished career in research and has published more than 50 technical papers during the past 40 years. He was one of the first American students of fossil pollen and the techniques by which borings in peat bogs and similar locations throw light on the vegetation of the past. His work has provided much important information on postglacial changes in vegetation and climate in the northern United States. Recently he has turned his attention to pollen research in Mexico and the Southwest, where his work has produced some very interesting information about the antiquity of maize and on Pleistocene climatic history. He has been able to relate the results of this work to our growing knowledge of changes in climate and human culture in this region.

Sears brings to the presidency of the American Association for the Advancement of Science an intimate knowledge of its problems and a wide understanding of the relationships between science and human affairs that should make his service in this important office particularly fruitful. Our great Association is fortunate in having a man of his thorough training, wide sympathies, and balanced judgment to help it serve science and the nation in these difficult and dangerous days.

News and Notes

Solvay Physics Conference

The 10th Solvay Physics Conference met 13–17 Sept. 1954 in the rooms of the Université Libre in Brussels, Belgium, to consider the subject of *Electrons in Metals*. The sessions were presided over by Lawrence Bragg, assisted by the members of the scientific committee of the Institut International de Physique Solvay, W. Pauli, N. F. Mott, C. Møller, F. Perrin, and J. R. Oppenheimer (absent). There were about 25 persons present, in addition to the secretarial and administrative staff.

It was an appropriate time for the Solvay Conference to consider the field of electrons in metals. In the last few years there has been a rapid growth of experimental and theoretical interest in the field, a growth that promises to bring about a definitive understanding of many of the major problems of metals and alloys in the next decade. On the experimental side, powerful new tools are being employed: neutron diffraction, nuclear and electron spin resonance, low-temperature studies of equilibrium and transport properties, improved methods of chemical purification and crystal growth, and others of equal importance. On the theoretical side we are seeing the application of electronic computers to the calculation of wave functions and energy band structures, the developments in the investigation of the collective aspects of a Fermi gas, the realization of the importance, particularly in connection with superconductivity, of electron-phonon interactions, the increased consideration of degenerate bands and the effects of the spin-orbit interaction, and others.

The principal papers read at the conference included the following. C. G. Shull (Oak Ridge) spoke on neutron-diffraction studies of transition elements and their alloys. By neutron methods it is possible to determine the average magnetic moment of each component of an alloy, thus providing a challenging test of theoretical calculations of the band structure of alloys. J. Friedel (Paris) described recent theoretical work on electron wave functions in alloys, with emphasis on the question of when the electrons associated with minority solute atoms join the common band structure of the alloy and when the electrons may be bound to localized impurity states about the solute atoms.

H. Fröhlich (Liverpool) spoke on recent theoretical advances in superconductivity, with emphasis on the exact solution of a particular one-dimensional problem involving an electron-phonon interaction. A. B. Pippard (Cambridge) discussed several experimental methods for the determination of properties of electrons at the Fermi surface in metals; the methods include microwave measurements of the anamalous skin effect and the study of the de Haas-van Alphen effect. D. Pines (Urbana) reviewed the work of Bohm and Pines on collective effects in a Fermi gas arising from the electron-electron Coulomb interaction. He discussed in particular the constructive influence of the collective treatment on the theoretical value of the paramagnetic susceptibility of metallic lithium, as compared with the experimental determination by resonance methods by Slichter and coworkers.

D. K. C. MacDonald (Ottawa) reviewed experimental measurements of various transport properties of metals at low temperatures, pointing out several unusual anomalies, such as in thermoelectric behavior, which call for extensions of the present elementary theories. L. Néel (Grenoble) proposed an explanation of metamagnetism, a term associated with the unusual magnetic behavior at low temperatures of magnetically concentrated salts such as cobalt chloride and nickel chloride. He also discussed the properties of several rare-earth ferrites, in which several magnetic transitions have been observed.

There were a number of other interesting papers, but it would miss the main point of a Solvay Conference to dwell longer on the prepared contributions. A Solvay Conference is organized to make possible a large amount of unrehearsed group and private discussion of unsolved problems, under pleasant and agreeable physical conditions, among a pliable number of persons representing an effective balance of active experimental and theoretical workers in the field under discussion, together with the members of the scientific committee who have broad and general interests. It is not necessary at a Solvay Conference to stand out in the corridors to discuss speculations, future programs, and current puzzles; rather, these directions are encouraged and ample time for discussion is provided in the regular session.

The conference was made possible by the generosity of M. Ernest Solvay and by the Université Libre. The hospitality shown to members was memorable, and on many occasions the participants were reminded appropriately of the ancient connections of Burgundy with Belgium. The scientific secretarial duties were executed enthusiastically by A. B. Pippard, and the capable administrative secretariat was directed by F. H. van den Dungen.

C. Kittel

Department of Physics,
University of California, Berkeley

Man-Made Diamonds

Climaxing four years of intensive work with high temperatures and pressures on different materials, scientists at the General Electric Research Laboratory in Schenectady, N.Y., have produced man-made diamonds. The diamonds, only a few carats so far, have been positively identified by x-ray inspection.

chemical examination, and hardness tests. Under the hardness tests, the GE diamonds proved to be capable of scratching anything, even other and natural diamonds.

A carbonaceous compound, not named by GE, was subjected for 16 hr to a pressure of roughly 800,000 lb per sq in. and temperatures above 5000 deg F in the laboratory's new 1000-ton press. This yielded a crystal nearly 1/16 in. in its longest dimension. Other crystals have been produced at pressures ranging up to 1,500,000 lb per sq in. Pressures such as these are roughly equivalent to the pressure that has been computed for points 240 mi beneath the earth's surface. Some of the diamonds have been produced in a matter of minutes.

The scientists responsible for the achievement were Francis P. Bundy, H. Tracy Hall, Herbert M. Strong, and Robert Wentorf. Scientists from other departments in the GE Laboratory have successfully repeated the initial experiments. Using different materials, temperatures and pressures. Altogether the several processes for making diamonds have been repeated successfully more than 100 times.

The diamonds produced in the GE Laboratory are of industrial quality only. C. Guy Suits, vice president and director of research at the laboratory, stated that no thought has yet been given to mass production and that no attempt has been made to produce diamonds of gem quality.—C.V.M.

Science News

More than half a million objects have been added to the scientific study **collections of the Smithsonian Institution** during the past year. The great majority were additions to the zoological collection, including such major items as 1500 small mammals collected in Korea by the Army Medical Services; approximately 3500 skins of birds and other ornithological items from Thailand and Cuba; 1042 specimens of reptiles and amphibians from Egypt; 5760 marine invertebrates from the Caroline Islands; and 100,000 mosquitoes from Thailand.

Botanical collections were increased by more than 24,000 specimens from the Fiji Islands, as well as large accessions from Brazil, the Ryukyu Islands, the Isle of Pines, Mexico, Tonga, and Malaya.

Geological collections were increased by such items as a white and a black opal from Australia and large crystals of little-recognized gem stones from Brazil and Lower California.

Major additions were made to the collections of fossils representing the life of the earth in other geological periods, such as 500 mollusks from the lower Cretaceous; 7500 invertebrates of the Devonian period; and groups of starfishlike animals from Oklahoma and Ontario. An outstanding collection of mammal fossils from the Eocene and Paleocene was obtained in Wyoming. An important exchange gave the institution a series of 22 specimens and casts of primitive jawless fish represented by fossils in the rocks of Norway and Spitsbergen.

On 27 Jan. the U.S. House of Representatives, by a 366–0 roll-call vote, passed a bill, HR 587, to permit members of the armed forces serving as of 31 Jan. to continue to build up **credits for education** benefits under the Veterans' Readjustment Assistance Act of 1952 (the Korean GI Bill). However, HR 587 has been amended to extend until 1965, rather than 1967, the date on which GI schooling must be completed. For each day of service after 26 June 1950, to a maximum of 3 yr, a serviceman accumulates 1½ days of education and training time.

India's per capita food consumption reached 1623 cal/day during the last year; in 1951 the average was 1398 cal. In the United States 2000 to 3000 cal. are considered necessary, the amount varying according to the person's physical needs.

Edward H. G. Hon and John M. Morris of the department of obstetrics and gynecology at the Yale University School of Medicine have reported an **improved test for pregnancy** in the *Yale Journal of Biology and Medicine* (vol. 27, No. 3). The test utilizes the common American toad, *Bufo americanus*, and can be completed in 4 hr or less; positive reactions frequently are available in as little as 2 hr. The method has been essentially 100 percent accurate in the diagnosis of normal pregnancy in some 2000 cases. Heretofore toad and frog tests have been considerably less accurate. Other pregnancy tests, such as the Friedman test with rabbits and the Aschheim-Zondek with mice, are accurate but require from 48 to 96 hr.

All of these tests, including the new one, are based on detecting the hormone chorionic gonadotrophin in a urine specimen. One of the chief advantages of the Yale test is an improved hormone concentration technique, a simplification of the widely used kaolin concentration technique for preparing urine specimens. With the new technique the average specimen can be prepared in approximately 10 min in contrast with the 45 to 60 min ordinarily required. Grants from the U.S. Public Health Service and Yale's James Hudson Brown Memorial Fund aided this research project.

Canada has announced that this year it will start construction of an **atomic plant** for the production of electric power. Atomic Energy of Canada, Ltd., a government agency, said in its annual report released on 24 Jan. that the experimental power plant might begin operation as early as 1958. The reactor, the country's fourth pile, may be built at the Atomic Energy

Center in Chalk River, Ont. It is not expected to provide electricity at economical rates, but will allow for "the kind of cost experience which will make possible . . . a larger and economic power reactor." Both the government and industry will cooperate in the design and construction of the pilot plant, but the major part of the cost will be borne by the government.

A clearing house for the nation's military research and development in the field of electronic parts, the secretariat of the Defense Department's **Advisory Group on Electronic Parts,** has been established at the University of Pennsylvania. It is staffed and operated by the university's Institute for Cooperative Research under Government contract. Heading the office is Edwin R. Petzing, secretary of the Advisory Group who is a retired brigadier general serving in a civilian capacity as a member of the university staff. The Advisory Group is responsible to the office of Donald A. Quarles, Assistant Secretary of Defense for Research and Development.

The secretariat will analyze and prepare digests of the work of the Defense Department's many electronic parts research projects in order to discover unfilled needs and to eliminate duplication. Therefore, more than half of the projected staff of 11 persons will be scientific and technical personnel. A skeleton staff already is operating.

In the United States in 1949–50 the number of deaths from **accidental poisoning in children** under 5 yr old was four times that of Great Britain. One-third of the deaths were caused by drugs, the commonest of which was aspirin. Adding the total number of children who met accidental death to the total number crippled by poisons produces a figure that far exceeds any drawn from the leading childhood diseases.

For this reason, a Committee on Toxicology has been established by the American Medical Association to study the health problems of drugs, household goods, and other materials, and to supply educational material to the public. Another important step is the establishment of poison control centers to cooperate with local hospitals.

The spectacular **progress against syphilis** that followed the discovery of penicillin has brought with it new problems and new dangers, according to a new 25-ct pamphlet, *Syphilis: The Invader* by Erik Barnouw and E. Gurney Clark just published by the Public Affairs Committee, 22 E. 38th St., New York. The pamphlet was prepared in cooperation with the Center for Mass Communication, Columbia University Press, and designed to accompany a new film, *The Invader*. The following achievements of penicillin therapy are listed: Deaths from syphilis have dropped from 11.1/100,000 population in 1939 to 3.7/100,000 in 1952; infant mortality from syphilis has dropped from .57/1000 live births in 1939 to 0.02/1000 live births in 1952; admissions of the syphilitic insane to mental institutions have dropped from 6.6/100,000 population in 1939 to 2.1/100,000 in 1951.

Because of penicillin's effectiveness, most of the federally supported rapid treatment centers had been closed by 1951. But the authors warn that the syphilis problem is not resolved: (i) the rapid treatment centers were an ideal setting for interviews by contact investigators, and the present local arrangements for follow-ups are too complex, which makes contact tracing more difficult; (ii) a moderate quantity of penicillin, perhaps prescribed for some standard infection, will not cure syphilis and may hasten the disappearance of outward symptoms so that they pass unnoticed; (iii) a decrease in the number of cases treated may not mean a decrease in the number who have syphilis, for the search for cases is being made on a far less sweeping scale than in previous years.

Wild birds have been linked conclusively to the **spread of encephalitis** by a research team consisting of William C. Reeves and W. McD. Hammon, professors of epidemiology representing the University of California's campuses at San Francisco and Berkeley; C. M. Herman of the California Department of Fish and Game; H. E. McClure, E. M. French, and B. Brookman of the U.S. Public Health Service; and R. C. Herold and L. Rosen, both technical assistants from the university's San Francisco campus. Their findings, the result of 6 yr of research, are the first to show without doubt that wild birds constitute an important natural source of the viruses that cause encephalitis. It has been known for a long time that the mosquito, *Culex tarsalis,* is largely responsible for infecting horses and human beings with the viruses that cause encephalitis; however heretofore it has not been known where *Culex tarsalis* got the viruses.

Secretary of Defense Wilson has issued a special directive, dated 20 Dec. and distributed 2 Feb., to the secretaries of the Army, Navy, and Air Force that announces the establishment of an **industrial security review office** with a director to be appointed by him and responsible to him. Until now the secretaries have had the power to decide the security status of civilian employees in plants holding defense contracts. Wilson stated that the security program is "suffering from certain deficiencies in operation, the principal cause of which is lack of centralized control and direction."

The new security director, still unnamed, will work closely with the three military services, but he and Wilson will have the final authority in determining the security classification of any individual. The review office will also follow all cases going through the regional hearing boards in New York, Chicago, and San Francisco and will keep the services informed of "difficult and unusual" situations. An official in the Defense Department cited the case of Edward U. Condon [*Science* **120**, 1088 (31 Dec. 1954)] as one that would not have become so controversial if the new procedure had been in effect last summer.

A recent nationwide survey by the Bureau of Medical Economic Research of the American Medical Association shows that **more men are hospitalized** than women. A breakdown of the totals demonstrated that even in the childbearing years of life, ages 15 to 44, men exceeded women in hospitals by 13,000. At ages 45 to 64 the excess was more than 51,000 but after 65 it dropped to 2000. Surveys of accidents and occupational diseases might shed more light on the difference, but the latter would hardly explain why there were 11,300 more males than females under 15 yr of age in hospitals.

The State of Missouri Conservation Commission has shipped 36 **cottontail rabbits to France,** where the French Ministry of Agriculture will use them in crossbreeding and inoculation studies directed toward combating myxomatosis, a disease that is threatening the European rabbit industry. The Missouri commission would like to have advance knowledge if the cottontail rabbits are susceptible to the disease in order to develop effective preventive measures.

A new division, to be known as the **Medical Information and Intelligence Division,** has been created in the Office of the Army Surgeon General. Formerly known as the medical intelligence branch, the new division was then a component of the preventive medicine division, where it was concerned with compiling medical and sanitary data on areas outside the United States, and with coordinating all foreign liaison activities of the Office of the Surgeon General and Class II medical installations. As a division, it will continue its former functions and will in addition supervise the security functions of the Office of the Surgeon General and provide medical information on foreign areas to authorized individuals and agencies.

Chief of the new division is Philip W. Mallory, colonel in the Medical Corps. Arthur R. Turner, formerly chief of the medical intelligence branch, will be technical director. All civilian employees of the former medical intelligence branch have been retained in the new division.

Homi J. Bhabha, leading Indian nuclear physicist, has been appointed president of the international **conference on the peaceful uses of nuclear energy** that is to take place in Geneva beginning 8 Aug. Walter G. Whitman, head of the chemical engineering department at Massachusetts Institute of Technology and in 1948 director of the Atomic Energy Commission's Lexington Project, has been named secretary general of the conference, making him the top officer of the United Nations staff handling preparations for the talks.

A long technical agenda has been made public, as well as a set of rules intended to keep political issues out of the meeting. No resolutions requiring votes are to be offered, and Bhabha, as president, has been empowered to call to order any speakers who stray from the relevant technical topics. The rules further stipulate that scientific papers shall be reviewed by a panel designated by the U.N. Secretary General, Dag Hammarskjold. The conference is to meet for 12 working days, with English, Russian, French, and Spanish as the official languages. Each of the 84 participating countries is limited to five representatives but can bring along advisers.

John T. Rettaliata, president of Illinois Institute of Technology, pointed out recently in a speech at a military-industrial conference on technical manpower that education of **women in engineering** in the United States has been progressing at a "snail's pace" when compared with the rate in Soviet Russia, where an estimated 25 percent of the engineers are women. In this country, less than 1 percent of the approximately 500,000 engineers are female.

A **nuclear x-ray machine** for war or peacetime use has been developed by the Army. The device uses radioactive thulium and radiosensitive photo paper; the thulium is expected to last for approximately a year. Neither electricity, water, nor dark room is needed to develop the picture, which shows immediately. The whole machine, including a lead-lined case to protect personnel, is contained in a 48-lb unit that may be packed on a medical aidman's back.

Humberto Fernandez-Moran V, director of the Venezuelan Institute for Neurology and Brain Research, Caracas, Venezuela, has announced that his country plans to be the first nation outside of the United States to undertake mass immunization of its citizens with the **Salk polio vaccine.** Early this spring Fernandez-Moran will institute a pilot study of the vaccine among 2000 infants in Venezuela to determine the systems and procedures to be used in the mass program. Wyeth Laboratories, which with four other concerns has pioneered in the manufacture of the Salk vaccine upon the invitation of the National Foundation for Infantile Paralysis, will provide the vaccine for the Venezuelan study at no cost.

A portable battery-operated **monitoring instrument** that is pushed over the floor like a vacuum cleaner has been announced by the University of California's Los Alamos Scientific Laboratory. This new device for detecting radioactivity, Model FM-1, was designed by Mark H. Tattan of the laboratory's chemistry and metallurgy division. Heretofore, a technician holding a small-area probe has had to crawl on his hands and knees in order to detect alpha contamination on a large floor area. Model FM-1 does away with this inconvenience.

It comprises a basic box unit mounted on three wheels, and a 3-ft handle on which a control box is mounted. The basic unit serves as a rolling bed for an alpha-sensitive probe and associated power supplies and amplifiers. The handle-mounted control box con-

tains a reset switch, a range switch providing ranges of from 1 to 2000 or 1 to 20,000 counts/min, a loudspeaker for audible signals of alpha counts, and a count rate meter. The voltage to the probe is easily adjustable to allow for changes in atmospheric density at various altitudes, and the entire instrument is designed for easy disassembly and repair.

Scientists in the News

On 17 Dec. **Nathan M. Pusey,** president of Harvard University, issued the following statement about the case of **Wendell H. Furry,** associate professor of physics.

> Indictment has been found against Dr. Furry charging him with the misdemeanor of refusing to answer questions of a Senatorial committee concerning other people. He has not been indicted for refusing to answer questions about his own connection with the Communist Party; he testified under oath that he dropped out of the Communist Party a number of years ago. He also abandoned reliance on the Fifth Amendment, the use of which we had deplored. We continue to favor full disclosure in these matters, but the legal consequences of his refusal will presumably be determined by the courts. So long as the case is pending, we do not think it appropriate to make any further statement on the subject.

The Society of Illinois Bacteriologists has announced that **Perry W. Wilson,** professor of bacteriology at the University of Wisconsin, is to receive this year's Pasteur award on 30 Apr. for his research in the field of nitrogen fixation. Wilson's work has been directed primarily toward explaining the chemistry of the nitrogen-fixation process, including the isolation and study of the enzymes involved. A major contribution is his discovery that hydrogen is a specific inhibitor of nitrogen fixation, and that bacteria with a hydrogenase enzyme system usually have the capacity to fit atmospheric nitrogen. This discovery revealed the fact that nitrogen fixation can be performed by many species of bacteria, and that any bacteria with the hydrogenase enzyme system are potentially capable of nitrogen fixation.

Kenneth D. Nichols, a major general and a West Point-trained Army engineer, has announced his resignation as general manager of the Atomic Energy Commission, effective 1 May. He plans to establish a consulting engineer's office in Washington, D.C.

In January **George W. Bain** of Amherst College began a 7½-mo around-the-world-trip planned primarily for studies of geology, geography, and resources in Indonesia, Australia, and New Zealand.

Markus E. Fierz, professor of theoretical physics at the University of Basel, Switzerland, is serving until 2 Apr. as a visiting professor of physics at the University of Maryland. He is giving a course on the foundations of statistical mechanics and is conducting seminars in theoretical physics as well as working closely with the research groups in that subject.

Fierz has made major contributions to at least three widely different fields of physics: statistical mechanics, quantum field theory, and nuclear physics. In collaboration with Nobel prize winner Wolfgang Pauli, he made a fundamental contribution to the theory of quantum statistics. He has developed the theory of particles of arbitrary spin and has published many important papers in meson theory and the theory of beta radioactivity. He also serves as editor of *Helvetica Physica Acta.*

The following appointments to assistant professor have been announced. University of Texas: **Edward C. Jonas,** geology. State College of Washington, Pullman: **Robert J. Foster,** chemistry. State University of New York College of Medicine, Brooklyn: **Edward A. Eckert,** microbiology. West Virginia University: **William Knox Harrell,** bacteriology.

Paul Edward Garber, head curator of the National Air Museum, Smithsonian Institution, has been awarded the 1954 trophy of the Washington Air Derby Association in recognition of his "untiring and unselfish efforts on behalf of all phases of aviation, and in particular because of his furtherance of aviation interest and education through a personal determination to assist in the development of the greatest air museum in the world, and also because of his efforts to glorify the deeds and accomplishments of others in aviation."

John Blair Macauley, director of technical coordination for the Ethyl Corp., has been appointed Deputy Assistant Secretary of Defense (research and development).

Two appointments have been announced by the new $11,000,000 Quartermaster Research and Development Center in Natick, Mass. **Torsten Hasselstrom,** formerly at the Philadelphia Quartermaster Depot, is chief of the organic chemistry section. **David E. Bass,** who was a biochemist at the Quartermaster Climatic Research Laboratory at Lawrence, Mass., is chief of the biochemistry section.

On 1 Jan. **G. N. Hoffer** retired as midwest manager for the American Potash Institute, a position which he had held since the formation of the institute in 1935. Hoffer is known for his research in plant nutrition, plant physiology, corn breeding, and diagnostic techniques for identifying plant-food deficiencies. He pioneered in the study of the nutrient needs of crops. Because of his early observation and study of root diseases and root development of corn, he was one of the first to recognize that the deterioration in the structure of Midwest soils was caused by the deple-

tion of organic matter and the use of heavy machinery. He will remain active as a consultant and his residence will continue to be in West Lafayette, Ind. He has been succeeded by **Werner L. Nelson**, who resigned his connections with North Carolina State College last October to work with Hoffer.

Outstanding research achievements earned Borden awards of a gold medal and $1000 for eight scientists and a joint award for two others during 1954. The administering associations and the recipients are as follows.

American Dairy Science Association: **Lester E. Casida,** University of Wisconsin, for studies affecting the breeding efficiency of dairy cattle; and **Paul R. Elliker,** Oregon State College, for his work on bacteriology and sanitation in the dairy industry.

American Veterinary Medical Association: **Myron G. Fincher,** Cornell University, for research on mastitis and other phases of large animal medicine.

American Academy of Pediatrics: **Paul Gyorgy,** University of Pennsylvania, for contributions to the science of nutrition in the field of pediatrics.

American Chemical Society: **Donald V. Josephson,** Pennsylvania State University, for work resulting in fundamental advances in dairy chemistry and practical advances in dairy manufacturing.

Poultry Science Association: **Walter Landauer,** University of Connecticut, for research contributions in developmental and physiological genetics.

American Home Economics Association: **Jane M. Leichsenring,** University of Minnesota, for original and fundamental research in human nutrition.

Association of American Medical Colleges: **Karl F. Meyer,** University of California, for contributions of great importance to preventive medicine and worldwide public health.

American Institute of Nutrition: **Agnes Fay Morgan,** University of California, and **Arthur H. Smith,** Wayne University, (joint award), for studies on the effect of heat on the nutritive value of milk proteins.

Abdul R. K. Zobairi, Superintendent of Fisheries for the Government of East Bengal, Pakistan, has been awarded the U.S. Fish and Wildlife Service's certificate of merit for fishery training. Under the Foreign Operations Administration's technical assistance program, Zobairi recently became the first person to fulfill the requirements for a Ph.D. in aquatic biology and fish culture at Alabama Polytechnic Institute.

William Lester, Jr., associate professor of medicine at the University of Chicago, has accepted appointment as chief of staff of the Suburban Cook County Tuberculosis Sanitarium District's hospital-sanitarium. His particular interest is infectious diseases and he is now conducting research in the epidemiology of tuberculosis.

George N. Papanicolaou, professor of clinical anatomy at Cornell University College of Medicine, will receive the 5th annual Bertner Foundation award and give the Bertner lecture at the 9th annual Symposium on Fundamental Cancer Research at the University of Texas M. D. Anderson Hospital and Tumor Institute on 11 Mar. He is being honored for his contributions to exfoliative cytology.

Harold Stanley Stewart, Jr., physicist and head of the radiometry branch at the Naval Research Laboratory, Washington, D.C., has received the Navy's highest civilian award for his "brilliant scientific accomplishments and leadership" during the last 8 yr in a program undertaken in collaboration with the Atomic Energy Commission.

Robert Reynolds Macintosh, Nuffield professor of anesthetics at the University of Oxford, has been appointed visiting professor of anesthesiology at the State University of New York College of Medicine in Brooklyn for the month of May.

Douglas R. Hartree, Plummer professor of mathematical physics at Cambridge University, England, spent 6 wk in January and February at the Strawbridge Observatory at Haverford College. He gave a series of lectures on the calculation of atomic structures.

Oleg Yadoff, president of the Applied Physics Research Foundation, Palo Alto, Calif., has recently been elected honorary vice president of the International Union of Professional Engineers. He will be in charge of liaison work, having as his special concern the development and maintenance of good relations between the International Union and the National Society of Professional Engineers.

The 80th birthday of **Anton J. Carlson** was celebrated at a dinner given by his colleagues at the Quadrangle Club in Chicago on 29 Jan. Carlson, who retired as Frank P. Hixon distinguished service professor at the University of Chicago 15 yr ago after having been a member of the faculty there since 1904, is still studying nutrition in the university's laboratories, and in addition is consulting on problems of research in aging, alcoholism, and poliomyelitis. Earlier, he made important contributions to the study of hunger and digestion, nerve activity, and glands.

Chandler A. Stetson, Jr., who since 1951 has served the American Heart Association as an established investigator, has been named associate professor of pathology at New York University College of Medicine. His major interests have been experimental pathology, the pathogenesis of rheumatic fever, and the clinical investigation of streptococcal diseases and their complications.

Henry R. Kraybill, director of research and education of the American Meat Institute Foundation at the University of Chicago, has been elected to the additional post of vice president.

The Netherlands Government has awarded the decoration of Officer in the Order of Orange-Nassau to **Morris Fishbein,** medical editor and clinical professor of medicine in the University of Illinois College of Medicine and professorial lecturer in the University of Chicago School of Medicine. He was honored in recognition of his contribution to the success and growth of *Exerpta Medica,* "enabling it to render invaluable service to the medical world."

Richard T. Street, formerly of Loyola University of Los Angeles, is investigating the ethology of animals, and especially dogs, at the Dana Point Medical Dental Center, Dana Point, Calif. The work is supported by an anonymous grant.

Harrison Shull, assistant professor of chemistry at Iowa State College who is at present a Guggenheim fellow at the University of Uppsala, Sweden, has been appointed associate professor of chemistry at Indiana University, effective in September.

Joseph E. Alicata, head of the department of parasitology at the University of Hawaii Agricultural Experiment Station, Honolulu, and senior scientist, U.S. Public Health Service (R), recently returned from Jordan, where he assisted in organizing the section of parasitology of the Central Government Laboratory in Amman and conducted research on intestinal parasites and on malaria control. This work was carried out through the Cooperative Department for Health and Sanitation, U.S. Operations Mission to Jordan, and the Ministry of Health, Government of Jordan.

George G. Mallinson, who has been teaching education and psychology at Western Michigan College since 1948, has succeeded **Elmer H. Wilds,** retired, as director of graduate studies. Mallinson is well known in science teaching, and his writings appear frequently in scientific and educational journals. In 1953 he was named president of the National Association for Research in Science Teaching.

The Glycerine Producers' Association has announced eight recipients of the 1954 Glycerine Research awards. First award of an honor plaque and $1000 was presented to **Robert K. Summerbell,** a professor at Northwestern University, and **James R. Stephens** of the American Cyanamid Co., Stamford, Conn., for their proof of the structure and configuration of a number of well known derivatives or glycerine and some new related chemical compounds. This work, carried out over a 4-yr period at the Northwestern University Chemical Laboratories, provides other chemists with fundamental information enabling them to investigate the potential value of these compounds in such diverse fields as pharmaceuticals and plastics.

In one of the most complete studies of glycerine derivatives ever made, Summerbell and Stephens proved the structure and configuration of 2,5- and 2,6-disubstituted dioxanes, all derivatives of the cyclic diethers of glycerine. The configuration of diglycerol, diepichlorohydrin, diepiiodohydrin, and other derivatives was thus established. Several new derivatives including potentially important dicarboxylic acids were also prepared and studied.

Two teams of chemists share the second award of honor certificate and $300 stipend for establishing independently the biological asymmetry of glycerine—that is, the manner in which certain enzymes, in converting the compound into other chemical substances in biological processes, act preferentially upon one of the apparently identical end carbon atoms in the glycerine molecule. **Robert W. Swick** and **Akira Nakao** formed one team carrying out research at the Argonne National Laboratory, Lemont, Ill. The other team was composed of **Harland G. Wood** and **Per Schambye** of Western Reserve University, and **G. Popjak** of the National Institute for Medical Research, Mill Hill, London.

A new, simple method of transfusing thawed red blood cell–glycerine mixtures directly into the veins was granted third award of honor certificate and $200 stipend. This development, the work of **Henry A. Sloviter** of the University of Pennsylvania School of Medicine, may make practical prolonged storage and stockpiling of erythrocytes at low temperatures for use in case of national emergencies.

Georges Ungar, former head of the Laboratory of Experimental Medicine and assistant professor of physiology at the University of Paris, has been appointed director of the division of pharmacology and experimental physiology of the U.S. Vitamin Corp. and its pharmaceutical division, the Arlington-Funk Laboratories at Yonkers, N.Y.

Harold Thompson, founder and for 17 yr chief of the Division of Fisheries of the Commonwealth Scientific and Industrial Research Organization in Australia, has retired. He was born in Aberdeen, Scotland. After taking the degrees of M.A. in 1912 and B.Sc., in 1920, he was for 10 yr scientific adviser of the Fishery Board for Scotland. There he so distinguished himself that he became a world figure in fisheries investigations. In 1927 he attained the degree of D.Sc. at the University of Aberdeen for his work on the natural fluctuations in the stocks of haddock. The report of this work is now regarded as a classic in fisheries literature. In 1930 he became director of fishery research in Newfoundland, where he founded a research organization and established principles for the modernization of the Newfoundland fishing industries.

In 1937 he assumed his Australian post. The Division of Fisheries under Thompson's leadership has

become one of the leading laboratories of its kind in the world. It has contributed much to the establishment and extension of the whale, tuna, crayfish, and shark fisheries, and has shown the need to relax the fishing pressure on certain kinds of fish, while indicating others that might be used to take their place. The division has also advanced the study of the movement and fertility of Australian seawater masses on which all marine life depends.

Claude-Starr Wright, former associate professor of medicine at Ohio State University Medical Center, has been appointed associate professor of medicine at the Medical College of Georgia.

John C. Baiardi, head of Long Island University's department of biology, has been appointed chairman of the new department of medico-surgical research at Roslyn Park Hospital, Roslyn Heights, N.Y., where he will conduct a program of research on problems in biology and physiology.

Harry J. Loynd, president of Parke, Davis and Co., has announced the promotion of **George Rieveschl, Jr.,** to a new post as scientific assistant to the president. Rieveschl, who has been director of chemical research for the pharmaceutical firm since 1949, was primarily responsible for the chemical work on Benadryl, first U.S. antihistamine used in the treatment of hay fever and other allergies.

Shelbey T. Grey of Chicago has been appointed chief of the Food and Drug Administration's Program Research Division. He has been the agency's district chief at Chicago, where he will be succeeded by **George T. Daughters,** now district chief at Baltimore.

William H. Huggins, professor of electrical engineering at Johns Hopkins University, was recently presented the Air Force decoration for exceptional civilian service at ceremonies held in the Air Research and Development Command headquarters in Baltimore. He was honored for his exceptional performance of duties as chief of the plans branch, Directorate of Electronics Research, at ARDC's Air Force Cambridge Research Center, Cambridge, Mass., from January 1946 to August 1952.

Recent appointments at the General Electric Research Laboratory, Schenectady, N.Y., are as follows.

J. E. Burke, former manager of metallurgy in G.E.'s Knolls Atomic Power Laboratory, has been named manager of the newly created ceramics studies section in the metallurgy department.

Benjamin Segall, who was a research fellow at the Institute of Theoretical Physics of the University of Copenhagen, and who for the past year has been on the staff of the radiation laboratory at the University of California, will work in the light production studies section of the general physics department.

Joseph M. Denny, formerly a research engineering consultant for the North American Aviation Co., is a research associate in the metallurgy department.

Necrology

Donald W. Bogart, 49, surgeon, author, former assistant clinical professor of ophthalmology at New York University, New York, 28 Jan.; **John F. Gile,** 62, professor of surgery at the Dartmouth Medical School, Hanover, N.H., 29 Jan.; **Hubert V. Guile,** 74, cardiologist, founder of the Bellevue cardiac clinic, former clinical professor of medicine at New York University, New York, 29 Jan.; **Harry N. Irwin,** 70, retired dean of the School of Education of Western Reserve University, Cleveland, Ohio, 27 Jan.; **Thomas Lewis,** 65, former director of the Welsh College of Pharmacy at Cardiff, Wales, former vice president and technical director of S. B. Penick & Co., New York, 29 Jan.

Ellice McDonald, 78, cancer research specialist, director of the Biochemical Research Foundation of the Franklin Institute, Philadelphia, 30 Jan.; **Edward S. Maclin,** 69, former president of West Virginia Institute of Technology, Montgomery, W. Va., 30 Jan.; **Angel Maldonado C.,** 65, dean of the Faculty of Pharmacy at the University of San Marcos, director of the Unanue Meteorological Observatory, Lima, Peru, 31 Jan.; **Edward Mellanby,** 70, authority on nutrition, author, professor emeritus of pharmacology at Sheffield University, Sheffield, England, 30 Jan.; **Holger Nielsen,** 89, inventor of the Nielsen method of artificial respiration, Copenhagen, 31 Jan.

Mim Kemal Oke, 71, pioneer roentgenologist, author, former professor of medicine at Guthane Military Medical Academy, Istanbul, Turkey, 30 Jan.; **Anderson M. Scruggs,** 55, professor of dentistry at Emory University, Atlanta, Ga., 28 Jan.; **Emmi Stein,** 74, eminent geneticist, Tübingen, Germany, 21 Sept.; **Robert C. Wallace,** 73, geologist, executive director of the Arctic Institute, Montreal, 29 Jan.; **Herbert B. Wilcox,** 80, pediatrician, former director of the New York Academy of Medicine, former professor of diseases of children at the College of Physicians and Surgeons, Columbia University, New York, 1 Feb.

Meetings

A Symposium on the Antimetabolites—Their Modes of Action and Their Therapeutic Implications will take place at the Biltmore Hotel in New York on 1 Mar. The symposium, which is being held in conjunction with the 10th annual meeting of the National Vitamin Foundation, will feature reports and discussions by a selected group of specialists. The morning session will be under the chairmanship of Paul L. Day of the University of Arkansas, and the afternoon session will be chaired by Robert W. Heinle of the Upjohn Company, Kalamazoo, Mich. The symposium is open gratis to all interested physicians and scientists.

A **Conference on Biological Waste Treatment** will be held at Manhattan College, 13–15 Apr. Its objective is to present information on the principles of biological treatment processes and their application to the design of waste treatment facilities. Papers will be delivered by leading authorities from consulting engineering firms, industries, and universities. The mechanisms of biological treatment and the theory and design of aeration systems are the topics of two symposiums. Plant design for sewage and industrial wastes will be discussed at two full sessions. Additional information may be obtained from W. W. Eckenfelder, Civil Engineering Dept., Manhattan College, New York 71.

The spring assembly of the **Radio Technical Commission for Aeronautics** will be held jointly with the Los Angeles section of the Institute of Radio Engineers at Los Angeles, 5–7 Apr. A management symposium sponsored by I.R.E. will open the session. On 6 Apr. the R.T.C.A. business meeting will be followed by two symposiums, *The Reliability of Electronic Components in Air Vehicles* and *The Air Frame and Electronics.*

On the final morning *Electronics Systems in, of, by, and for Helicopters* will be the subject of a symposium. That afternoon, the delegates will be taken on a field trip to aviation installations in the Los Angeles area. This will be the first meeting of the R.T.C.A. assembly on the West Coast.

The **American College of Cardiology** will hold its 4th annual convention at the Hotel Biltmore in New York 18–20 May. Two sessions will be devoted to a symposium on hypertension and hypertensive heart disease, another session will be devoted to advances in cardiac surgery, and a fourth to the heart and circulation in sports. In addition to symposiums and panel meetings, there will be scientific and commercial exhibits outlining the latest advances in cardiology. Ashton Graybiel of Pensacola, Fla., will preside. Information may be obtained from the Secretary of the College, Dr. Philip Reichart, 140 W. 57 St., New York 19.

A **Conference on Low Temperature Physics** is to be held under the joint auspices of the International Union of Pure and Applied Physics and Commission I of the Institut International du Froid as part of the four-yearly International Congress of Refrigeration which opens at the Sorbonne, Paris, on 31 Aug. The first sessions will be devoted chiefly to the applied aspects of low temperature physics; those concerned mainly with pure physics will begin on 2 Sept. All the proceedings will be over by the evening of 8 Sept.

It is hoped that at least half the time of the conference will be spent in discussions. Therefore contributions should be as brief as possible and should be descriptions of work in progress rather than surveys of particular fields. Those wishing to attend and/or to read a paper should write to Prof. L. Weil, Institut Fourier, Place du Doyen Gosse, Grenoble, Isère, France, as soon as possible. Titles and abstracts of papers *must be submitted by 15 May.*

New drugs to combat low blood pressure, progress in chemical soil conditioning, and respiratory protective devices for civilian defense are among the subjects to be discussed at the **American Chemical Society's 127th national meeting** in Cincinnati, Ohio, 29 Mar.–7 Apr. Some 5000 chemists and chemical engineers from all parts of the United States will participate in sessions conducted by 19 scientific and technical divisions of the society. Joseph F. Treon of the University of Cincinnati College of Medicine is general chairman of the meeting.

A **Carbon Conference** will be held at the University of Buffalo, 9–10 June. Speakers from academic and industrial institutions will discuss the present status of knowledge in the field and will describe the research being conducted in their laboratories. The topics will include physical and chemical properties of cokes, carbons, graphites, and carbon blacks as well as some of the engineering problems involved in their production. For further information, write to the Carbon Conference, Dept. of Physics, University of Buffalo, Buffalo 14, N.Y.

A third day has been added to the program of the 3rd **National Air Pollution Symposium** originally announced for 18–19 Apr. The meeting will be held at the Huntington-Sheraton Hotel, Pasadena, Calif. It is expected to draw participation from international scientific and industrial interests in air pollution. Cosponsoring the symposium with Stanford Research Institute are California Institute of Technology, University of Southern California, University of California at Los Angeles, Southern California Air Pollution Foundation, and the Air Pollution Control Association of Pittsburgh, Pa.

The program will include sessions on "General aspects of air pollution," "Analytical techniques and instrumentation," "Physiological effects of air pollution on plants," "Physiological effects of air pollution on animals," and "Legal aspects of air pollution." General chairman is A. M. Zarem, assistant director in charge of S.R.I.'s Los Angeles division. Dale H. Hutchison, manager of the institute's air research section, is program committee chairman.

The 9th annual meeting of the **American Academy of Dental Medicine** will be held at the Park Sheraton Hotel in New York, 13–15 May. The program will feature Herbert S. Kupperman, New York University–Bellevue Medical Center, on the stress syndrome; Victor Witten of the Skin and Cancer Hospital, New York University–Bellevue Medical Center, on an aspect of dermatology; and Albert L. Stunkard and L. Hinkle, Jr., Cornell Medical School and New York

Hospital, on the physiologic and emotional aspects of stress as it affects the doctor and the patient. The field of implant dentures will be covered by Isaiah Lew, who will show movies of patients having this type of restoration. George Witkin is chairman of the meeting.

All members and interested dentists and physicians are cordially invited to attend. Programs and reservations are available through the office of the national secretary, Dr. William M. Greenhut, 124 E. 84 St., New York 28.

Registration for the 2nd **International Seaweed Symposium,** which is to take place in Trondheim, Norway, beginning 13 July, *must be submitted by 1 Mar.* to Prof. T. Braarud, Blindern, Oslo, Norway.

Society Elections

American Society of Parasitologists: pres., Clay G. Huff, Naval Medical Research Center, Bethesda, Md.; pres.-elect, Eloise B. Cram, National Institutes of Health, Bethesda, Md.; v. pres., Gilbert F. Otto, Abbott Laboratories, North Chicago, Ill.; sec., Arthur C. Walton, Knox College, Galesburg, Ill.; treas., Robert M. Stabler, Colorado College, Colorado Springs, Colo.

National Engineering Society: pres., Allison C. Neff, Armco Drainage and Metal Products, Inc., Middletown, Ohio; treas., Russel B. Allen, College Park, Md. The vice presidents are Louis F. Frazza, Hawthorne, N.J.; Warner How, Memphis, Tenn.; Robert J. Rhinehart, Pine Bluff, Ark.; Lindley R. Durkee, Seattle, Wash.; Garvin H. Dyer, Independence, Mo.; and Virgil E. Gunlock, Chicago, Ill.

Education

The inauguration of live, closed-circuit television for teaching demonstrations in the **Louisiana State University Medical School's** department of physiology as a part of the regularly scheduled teaching program occurred on 17 Jan., the opening day of the current course in medical physiology. It is believed that this is the first use of this medium as a regularly programmed component of any basic medical science course.

Using a Kay-Lab camera and monitor, and two standard 21-in. receivers, it is now possible to render an area less than 6 in.^{2} visible in fine detail to a class of more than 100 students. This equipment is used to supplement the experiments that are performed by the students by exhibiting experiments that are too complex for use in the regular student laboratory, and to perform demonstrations which, because of the small size of the structures and reactions involved, cannot be properly demonstrated to large classes in any other way. It is used also to teach technical procedures.

The television camera is especially suited to the enlargement of a cathode-ray oscilloscope screen, thus affording for the first time an opportunity to demonstrate nerve and muscle action potentials to large groups of students. Other uses currently scheduled include the demonstration of the nerve control of the heart, resuscitation of the heart in arrest and in ventricular fibrillation, and of the control of the peripheral musculature by the cerebral cortex in the monkey. As an aid in the program of correlating clinical material with physiological foundations, the television system is used to show the class "close-ups" of the appearance and reactions of patients. This new teaching aid was purchased with funds granted to the school by the Fund for Medical Education.

Establishment of a new type of "double major" course in which undergraduates at **Massachusetts Institute of Technology** may combine studies in science or engineering with humanities and social sciences has been announced. For the first time it will be possible for a student to obtain a B.S. degree by qualifying in both liberal arts and technological fields. The new plan of study, known as Course XXI, will be open to freshmen entering M.I.T. next fall. Students choosing the course will not only be required to take 2 yr of calculus and 2 yr of physics, as are all M.I.T. undergraduates, but will do advanced work at the same time in technological subjects and in the humanities and social sciences.

The chief purpose of the course will be to provide broad preparation for further graduate work in science, medicine, law, industry or other fields, or for nonprofessional careers starting immediately after graduation. The student can obtain a degree in 4 yr or, if he chooses, can continue his work through a fifth year to achieve professional status with a second B.S. degree. By a sixth year of study he can qualify for the M.S. degree.

The summer sessions of the University of Pittsburgh will offer, 13 June through 1 July, a course in the **ecology of fresh waters** in relation to human use that is designed for sanitary engineers, chemists, biologists, and so forth. This course will be given at the Pymatuning Laboratory of Field Biology at Linesville, Pa. Inquiries should be addressed to M. A. Shapiro, Graduate School of Public Health, University of Pittsburgh, Pittsburgh 13.

Next September **Brandeis University,** Waltham, Mass., will initiate a graduate program leading to the degree of master of arts in microbiology.

The **Pacific Marine Station,** Dillon Beach, Calif., will offer a course in invertebrate zoology and ecology for upper division and graduate requirements in zoology and paleontology during the summer session, 21 June–22 July. The existence of several handbooks for the

fauna, flora, and geology of the region will make it possible to devote more time to general principles than to the more routine studies of details. The instructor will be Joel Hedgpeth of the Scripps Institution of Oceanography. A nonprerequisite course for teachers and undergraduates will also be offered by Alden E. Noble of the College of the Pacific. Further information may be obtained from the Pacific Marine Station, College of the Pacific, Stockton, Calif.

The new international language known as Interlingua is being taught for the first time in a college classroom. With the start of the current semester, a noncredit **course in Interlingua** was introduced in New York University's Division of General Education. It is being taught by Alexander Gode, chief of the Interlingua division of Science Service.

An auxiliary tongue with regular, simplified grammar and root words from many national languages, Interlingua is designed to overcome language barriers faced by scientists and persons in foreign trade. Although it was originated only in 1951, Interlingua is now used by 10 scientific periodicals for publishing abstracts.

An intensive program in **infrared spectroscopy** will be given 18–29 July during the 1955 summer session at the Massachusetts Institute of Technology. The program, to be offered jointly by the institute's spectroscopy laboratory and department of chemistry, is designed for those who wish an introduction to infrared instrumentation and laboratory methods and for those interested in the use of infrared spectrums in the solution of chemical problems.

It will consist of two integrated 1-wk courses, one on the technique of infrared spectroscopy and the other on the applications of infrared spectroscopy, under the direction of Richard C. Lord, director of the M.I.T. spectroscopy laboratory, and Foil A. Miller, in charge of the spectroscopy laboratory at the Mellon Institute of Industrial Research. Further information may be obtained from Dr. E. H. Huntress, Director of the Summer Session, Massachusetts Institute of Technology, Cambridge 39, Mass.

Available Fellowships and Awards

The **Marineland Research Laboratory** at Marineland, Fla. (18 mi south of St. Augustine), wishes to announce that space is now available for investigators who are interested in utilizing its facilities for independent research in marine biology. Bordered by the Atlantic Ocean on one side and the Intracoastal Waterway on the other, the laboratory is favorably located with respect to many marine and estuarine environments, and possesses excellent facilities for the collection and maintenance of marine life ranging from minute invertebrates to sharks and porpoises. There is no charge for laboratory space and equipment. A brochure describing the laboratory and its facilities will be sent on request. All inquiries should be addressed to the curator, F. G. Wood, Jr., Marineland Research Laboratory, Marineland, Fla.

The Jacob Chandler Harper fellowship for medical research has recently been established at the **Scripps Metabolic Clinic,** La Jolla, Calif. This fellowship is primarily for the study of hematology in both laboratory research and clinical phases. Applications are now being accepted for appointments effective on 1 July. The stipend is $5000 per year and the fellowship is renewable. Candidates must be graduates of approved medical schools and have had at least 2 yr of internship. The work will consist of laboratory problems investigated by the use of radioisotope, biochemical, and microscopic techniques. Facilities for clinical work are available.

The **American-Swiss Foundation for Scientific Exchange** offers one or more grants for advanced research in the natural and medical sciences. Candidates must hold the Ph.D. or M.D. degree by date of departure. Application is open to men and women, preferably under 35 yr of age. Candidates must be U.S. citizens and must present proof of bachelor's degree or its equivalent at time award is taken up; good academic record and capacity for independent study; good knowledge of French or German; good moral character, personality, and adaptability; and good health.

Fields of study open to American students in Switzerland include chemistry, engineering, geology, and physics.

Information on the Swiss awards may be obtained from the Institute of International Education, 1 E. 67 St., New York 21. *Closing date for application is 1 Mar.*

Stevens Institute of Technology has announced the establishment of the **Robert Crooks Stanley fellowships in engineering and science.** The fund to support the fellowships, which will eventually total $250,000, is a gift of the family of the late R. C. Stanley, a Stevens graduate of the class of 1899 and chairman of the institute's board of trustees from 1935 to 1948. The fellowships will be awarded to full-time graduate students working for their M.S. or Ph.D. degree.

The **National Foundation for Infantile Paralysis** has announced that fellowships will be available for medical students who have a minimum of 8 wk of consecutive free time for study during 1955. Three types of fellowships are offered: (i) research in the biological and physical sciences related to medicine; (ii) physical medicine and rehabilitation; and (iii) public health and preventive medicine. The purpose of these fellowships is to introduce students to one of these three fields in order to enable them to determine their ability and aptitudes early in their careers.

The deans of each of the approved medical schools

in the United States have been asked to nominate two candidates for each of these fellowships. Students who have completed 1 yr in medical school are eligible for the research fellowships and those who have completed 2 yr are eligible for the other types. The student must be able to devote full time to the program for a minimum of 2 mo and a maximum of 3 mo. The stipend will be $200/mo.

Students should consult with the deans of their medical schools, who will supply further information and application forms. Applications must be submitted to the foundation far enough in advance to allow approximately 8 wk for administrative action.

A $10,000 gift to the **Carnegie Institute of Technology** department of electrical engineering from the **L. H. Terpening Co.** of New York, which manufactures analog computer elements and radar equipment, will be used to establish fellowships for graduate electrical engineers who are earning their doctorates in the field of analog computers. Four fellowships valued at $2500 each will be awarded over the next 2 yr. The fellows will devote all their time to research and study.

The **Scripps Metabolic Clinic** announces that applications for its postdoctoral fellowship in biochemistry, known as the Charles Willard Stimson fellowship, are being accepted. This fellowship is available each year and carries a stipend of $5000. Applications should be sent to the Scripps Metabolic Clinic, La Jolla, Calif., *before 1 May.*

Two Ciba research fellowships are available to qualified applicants in the division of obstetrics and gynecology of the **University of Tennessee** College of Medicine. The fellowships are a part of a 4-yr residency leading toward an M.S. degree in obstetrics and gynecology. The first year of this program is the fellowship year during which successful applicants will work in basic research. After this they are expected to proceed into the clinical residency. The fellowships begin 1 July and carry a stipend of $150/mo in addition to living quarters, food, and uniforms. Applications may be made to the Chief of the Division of Obstetrics and Gynecology, University of Tennessee College of Medicine, 894 Madison Ave., Memphis.

Cornell University will use a **Du Pont grant** to try to stimulate better science teaching in high schools. The fund will create special fellowships intended to encourage science students to enter science teaching and to help science teachers to take advanced study. One group of fellowships will give full tuition and $1200 toward expenses to science majors from liberal arts colleges who plan to spend 1955–56 at Cornell in courses leading to full certification for secondary school teaching and a master's degree.

A second group will cover full tuition and certain expenses for secondary school science teachers who wish to use the 1955 Cornell summer session for advanced work. Both programs will be under the general direction of Philip G. Johnson, professor in the School of Education, to whom inquiries should be addressed.

The National Science Foundation this summer will provide 30 stipends of $250 each and a limited number of fee exemption certificates amounting to $66 each to high-school teachers of chemistry, physics, and general science who wish to enroll in the **Institute for High School Science Teachers** to be held at Pennsylvania State University, 5 July–13 Aug. Detailed information and application forms are available from the Director of Summer Sessions, Pennsylvania State University, State College, Pa.

In the Laboratories

Midwest Research Institute, a nonprofit organization of 200 scientists in 18 different fields, celebrated its 10th anniversary in January. Located in Kansas City, Mo., Midwest was originally founded in 1945 to cover the six-state area of Missouri, Kansas, Arkansas, Iowa, Nebraska, and Oklahoma; however, for some time research work for eastern organizations has been expanding, and this spring the institute will move into a new $1½ million building.

Atomic Energy for Industry, Inc., a new company with headquarters in Cleveland, Ohio, has been organized by C. H. Lutz, who is resigning as assistant project manager in electronic work at Designers for Industry, Inc. The new company will concentrate on the commercial and industrial applications of atomic energy where such techniques are applicable—for instance, in the fields of radiography, tracers, thickness gaging, and quality control.

Plans for a multi-million dollar jet research center have been announced by **Westinghouse Electric Corp.** The development is expected to cost more than $12½ million and will be located at the present site of the company's jet engine plant south of Kansas City. The new laboratories will provide for research and development testing on components of new jet engine designs and for improving existing jet engines. The entire operation will be part of the division engineering department and will be under the supervision of Allan Chilton, chief engineer.

Plans for construction of another laboratory building at **Du Pont's Experimental Station** in Wilmington, Del., the third to be started within the last 6 mo, have been announced. The new $1,815,000, two-story structure for long-range and fundamental research will be shared by the explosives and organic chemicals departments and will provide facilities for approximately 40 scientists. Both departments will engage in

exploratory research, with the explosives department stressing the development of new product lines in the nonexplosives field. Upon the completion of the laboratory in early 1956, all 10 of Du Pont's manufacturing departments will have research facilities at the Experimental Station.

Miscellaneous

Notice is hereby given that from 31 July 1955 the **International Commission on Zoological Nomenclature** will start to vote on the following cases, involving the possible use of the plenary powers, for the purpose specified against each entry. Full particulars of these cases were published on 31 Jan. 1955, in Parts 1 and 2 of vol. 11 of the *Bulletin of Zoological Nomenclature*. (i) *Pleurotomaria* Sowerby (J.), 1821, validation of (if judged to be invalid); *anglicus* Sowerby (J.), 1818 (*Trochus*), validation of, and designation of, as type species of *Pleurotomaria* (Cl. Gastropoda); (ii) *Pachyceras* Bayle, 1878, (Cl. Cephalopoda, Order Ammonoidea), validation of; (iii) *Neanura* MacGillivray, 1893, and *Hypogastrura* Bourlet, 1839, designation of type species for; *Achorutes* Templeton, 1835, suppression of (Cl. Insecta, Order Collembola); (iv) *Crenophilus*, validation of, as from d'Orchymont, 1942; *aeneus* Germar, 1824 (*Hydrophilus*), validation of (Cl. Insecta, Order Coleoptera); (v) *Rhinopteraspis* Jaekel, 1919, validation of (Cl. Ostracodermi); (vi) *Anurophorus* Nicolet, [1842], designation of type species for (Cl. Insecta, Order Collembola).

Attention is drawn also to the proposed suppression of the generic name *Jumala* Friele, 1882, as a name calculated to give offense on religious grounds.

The above parts also contain proposals for the adoption of three "Declarations": (i) relating to transliteration of words normally written in Cyrillic characters [preliminary to insertion in the code as a schedule (Copenhagen decision)]; (ii) defining the status of a generic name published conditionally; (iii) clarifying Rule (f) in Article 30 (type species of a nominal genus established as a substitute for a previously established such genus but with a different type species).

Comments on the above cases should be sent as soon as possible to Francis Hemming, Secretary to the Commission, 28 Park Village East, Regent's Park, London, N.W.1.

A special 1-hr version of Edward R. Murrow's recent **interview with Robert J. Oppenheimer** will be distributed to all 11 educational television stations of the nation. This distribution has been made possible through the cooperation of the Fund for the Republic and the Columbia Broadcasting System. The stations are KUHT, Houston, Tex.; WKAR-TV, East Lansing, Mich.; WHA-TV, Madison, Wis.; WQED, Pittsburgh, Pa.; KQED, San Francisco, Calif.; WCET, Cincinnati, Ohio; KUON, Lincoln, Neb.; KETC, St. Louis, Mo.; WUNC-TV, Chapel Hill, N.C.; WEDM, Birmingham, Ala; and KCTS-TV, Seattle, Wash. The program will contain most of the material used in Murrow's "See It Now" telecast of 4 Jan.; in addition, it will include supplementary information from the 2½-hr interview actually filmed by Murrow.

In 58 cities in Canada and the United States physicians will participate in the first **international televised** postgraduate medical educational program ever held. Sponsored by the American Academy of General Practice with national headquarters in Kansas City, Mo., and Wyeth Laboratories of Philadelphia, a symposium on the "Management of streptococcal infection and its complications" will be presented. A group of six distinguished physicians selected from both countries will comprise the panel, which will be moderated by W. B. Hildebrand of Menasha, Wis., president of A.A.G.P. The program will occur on 24 Feb.

At least 12 pairs of identical **twin beef calves** that are not more than 5 mo old and that are located within 200 mi of Washington, D.C., are urgently needed by the U.S. Department of Agriculture for feeding experiments being conducted at the agricultural research center in Beltsville, Md.

In its June 1954 meeting, the Committee on Disaster Studies reviewed the current status of disaster research and considered a number of postulates upon which future study of **disaster research and disaster planning** might be based. Problems of preparation, warning, emergency behavior, responses to deprivation, recovery behavior, and long-term effects were discussed. Although all areas have received considerable attention, the committee felt that some have been relatively neglected. There is also a need for integrating or relating the existing theories of the social and physical sciences, for example, communication studies, to disaster field studies. A summary of these postulates has been prepared and is available to diaster researchers by writing to the Committee on Disaster Studies, National Academy of Sciences–National Research Council, Washington 25, D.C.

The bequest of the **John Lowell Sperry collection** of 182,000 moths, butterflies, and other insects to the American Museum of Natural History was announced recently. The new acquisition represents the largest single collection of any kind ever given to the museum. Mr. Sperry, who died a year ago, was an amateur lepidopterist who had built up the largest known private collection of moths of the family Geometridae. Nearly all of the 1200 known species of Geometridae in North America are represented in the collection, as well as are many species from Central and South America.

In addition to moths, of which there are almost 165,000 specimens from North America, Central and South America, Europe, India, and Africa, the Sperry collection contains about 16,000 butterflies and 1100 miscellaneous insects.

Report of the Berkeley Meeting, 26–31 December 1954

Raymond L. Taylor

Associate Administrative Secretary, AAAS

The report of any large scientific convention fulfills several useful functions. For those who were present, it provides an over-all account of the entire meeting, only a fraction of the sessions of which any person could have attended. Those who were absent are informed of what they have missed and may be prompted to attend another time. And, for future reference, there is a record of those data and impressions by which one year's meeting can be appraised or compared with others.

The 121st meeting of the American Association for the Advancement of Science—unique in that it was the Association's first national winter meeting west of the Rockies and also the first time in many decades that the AAAS has been able to meet, almost exclusively, upon a campus —was a truly memorable occasion. Although, inevitably, the housing accommodations were more scattered and less convenient than can be offered by the large hotels of a great city, this was offset by economies in cost, and the meeting was a decided success in all essential respects. The decision of the AAAS Executive Committee and Council to meet on the Berkeley campus of the University of California was amply vindicated since this meeting will long be remembered as one of the most pleasant, fruitful, and significant in the history of the AAAS.

Not only was this the largest diversified scientific meeting ever held on the Pacific Coast but it was one of the largest meetings ever sponsored by the Association, now in its 107th year. There were 3856 paid AAAS registrants, more than in any year since the exceptional 1949 meeting in New York. The Association does not make registration mandatory so it is probable that at least 4500 scientists, science teachers, and other science-minded persons were in attendance the week of 26–31 Dec. An *additional* 3612 persons visited the exhibits. Although size is not the most important aspect of a successful meeting, it is still an important factor, because it is related to the number of friends and colleagues one can meet and the number of persons who will hear, and perhaps discuss, one's paper. Both directly and indirectly, a substantial attendance assists materially with the finances of a meeting, through registration fees and from the satisfaction of the exhibitors who find that their expenses are well warranted.

In rich variety and high quality, the programs of the Berkeley meeting were impressive. No principal field of science was neglected. There were programs for specialists arranged by large societies in these fields and by some of the Association's sections. Characteristic of AAAS meetings, other sections and many of the participating societies organized strong interdisciplinary symposiums which brought diverse specialists together to consider areas of common concern. Of interest to nearly all scientists, such important matters as air pollution, scientific editorial problems, scientific manpower, the shortage of science teachers, and national security were presented to appreciative audiences. There were also all the customary features expected at AAAS meetings—outstanding evening addresses, the latest scientific films, large-scale exhibits, and, on the last evening, the traditional Biologists' Smoker with refreshments and cigarettes contributed by the Coca-Cola Company, the National Biscuit Company, and Philip Morris & Co. Ltd., Inc.

Despite the record-breaking number of 105 symposiums, groups of invited papers, and panels, apparently all programs had audiences satisfactory to their chairmen. Indeed, there were numerous instances of expectations exceeded, which in some cases necessitated last-minute changes to a larger session room. In addition to the programs of the AAAS sections, an unprecedented number of 90 societies and other organizations participated, 57 with programs of their own, the others as official cosponsors. One result was still another record: the AAAS General Program-Directory reached the unprecedented size of a 17-oz book of 420 pages.

There were favorable comments from all sides on the exceptional physical facilities of the University of California. In very large measure, credit for the efficiency and "smoothness" of the arrangements and servicing of the more than 350 sessions should go to the administrative staff and the employees of the university, who, without exception, were efficient, cooperative, and friendly to an unparalleled degree. The writer, the Association, and those who attended are especially indebted to those employees, faculty members and their wives, members and friends of the Association, and students who volunteered their services. The degree of assistance given in the AAAS Office, in the Press Room, in the exhibit area, and with the Visible Directory of Registrants constitutes a highlight of the Berkeley meeting.

Among the memorable events of the Berkeley meeting were the AAAS presidential address and reception, 28 Dec. President Robert Gordon Sproul's remarks when, as host and general chairman, he welcomed the AAAS to the campus, were delightful in their warmth and humor. Following President Warren Weaver's introduction of the retiring president, E. U. Condon received a spontaneous standing ovation prior to delivering his address, "A half-century of quantum physics." Not only was the auditorium of Wheeler Hall filled to capacity with some persons standing, but two additional rooms equipped with public-address systems were also filled beyond normal capacity. The AAAS reception that followed in nearby Stephens Memorial Union was thoroughly enjoyable, with refreshments arranged by Mrs. Sproul. Representatives of the Chinese and South African associations for the advancement of science were among those in the receiving line. The previous afternoon, Mrs. Sproul and Mrs. Clark Kerr had entertained some 400 ladies attending the meetings at tea in the Women's Faculty Club.

Through the cooperation of the University Food Services, those who roomed in the residence halls enjoyed breakfasts "in" before leaving for sessions of their choice. Coffee and light refreshments were available during the day in the lounge of the Gymnasium for Men and in the attractive new Alumni Lounge, which served as a meeting place for all. The University Cafeterias, which served all meals and took care of simultaneous banquets, were a convenience much appreciated by the attendance.

A significant occasion was the all-afternoon program for 850 selected high-school students from the San Fran-

cisco Bay area interested in science as a career, sponsored by the Association's Academy Conference and held on the new campus of San Francisco State College, a cosponsor. From 1 to 5 P.M. on 28 Dec. this audience of scientists of tomorrow (which could have been several times larger than it was if a larger auditorium had been available) enjoyed addresses and expert counsel on opportunities and careers in science from Warren Weaver and Harry C. Kelly, the GE "House of Magic," a panel, "Youth looks at science," moderated by James Stoney, and special film showings of *Nature's Half Acre* and *Water Birds*, through the courtesy of Walt Disney Productions. Local chairmen in charge of the entire project were Eugene Roberts, president of the California Science Teachers Association, northern section, and Robert Stollberg, professor of physical science and education at San Francisco State College. This Ninth Junior Scientists Assembly, especially arranged, was a departure from previous programs and marked the intention of the Association to do more for precollege science students at its annual meetings.

All aspects of the 121st AAAS meeting deserve more than passing attention and are discussed under subject headings.

AAAS general symposium. In Feb. 1954, the AAAS Symposium Committee, consisting of 19 prominent West Coast scientists, Warren Weaver, and the writer, ex officio, met in Berkeley to plan the General Symposium of the 121st meeting. One three-session general symposium, *Science and Society*, was decided upon, and separate program chairmen were chosen to organize each part, scheduled for 4 P.M., 27–29 Dec. inclusive. Part I, "Natural resources," arranged by Louis B. Slichter, speakers, Farrington Daniels, Evan Just (in absentia), and J. G. Harrar; part II, "Population problems," arranged by Curt Stern, speakers, Curt Stern, Dudley Kirk, and Alan Gregg; and part III, "Science in human thought and action," arranged by Roger R. Revelle, speakers, Joel Hildebrand, Bart Bok, and John von Neumann. All these enjoyed appreciative audiences, which ranged in size from 250 to 600.

Other symposiums. At Berkeley, the sections and societies together scheduled 105 symposiums, groups of invited papers, panels, or other sessions centered about a particular theme. The number is larger than that for any previous AAAS meeting—the previous high was 62 at St. Louis. Even discounting an arbitrary quality in classifying as a "symposium" any session of papers grouped under a common subject heading, the number of well-planned, organized programs of this type was impressively large. It would be impracticable to repeat here the complete list, which has appeared both in the General Program-Directory and in the preconvention issue of *Science*, but some of these symposiums should be singled out because of the subject or the attendance they attracted. These include (figures in parentheses are attendance counts made during the sessions):

Third Berkeley Symposium on Mathematical Statistics and Probability, *Statistical Mechanics* (225), *The Spatial Distribution of Galaxies* (205), and *Probability and Induction* (225); American Physical Society, *High Energy Physics* (360) and *High Energy Machines* (460); Section C, *Nucleic Acids and Nucleotides* (160); Section E, *Earth Sciences from the Air* (85, 320).

Marking Organisms in Ecological Studies arranged by the Ecological Society of America, western section (140); National Association of Biology Teachers, especially *Biology for Survival* (190); Western Society of Naturalists, *Photochemical Effects in Biological and Biochemical Systems* (121, 116), *Natural Resources of the West* (124), and *The Cell* (539, 550); Section G, *Modern Views on Tissue Differentiation* (102); *The Mode of Survival of Plant Pathogens in the Soil* (124), a program of the American Phytopathological Society, Pacific division; and Mycological Society of America, *Physico-chemical Control of Structural Differentiation in the Fungi* (265).

Section H, *Culture Change in the Pacific Area* (65, 118); Section I, *The Nervous System and Behavior* (155); *Perception: Learned and Unlearned* arranged by the Western Psychological Association (168); Section K, *The Social Structure of Cities* (120); the session, *National Defense against Atomic Attack* of the National Academy of Economics and Political Science (132); Section M, *Air Pollution* (170, 203).

Section N, *Physiology of Growth—Normal and Abnormal* (212, 210); *Preparation for Medical and Dental Education in the Liberal Arts College* arranged by Alpha Epsilon Delta (160); panels on *Recent Advances in Psychiatry-Pharmacology*, American Psychiatric Association (100, 98); *Recent Advances in Biophysics and Medical Physics*, Donner Laboratory of Biophysics and Medical Physics of the University of California (181, 278); *Adrenal-Pituitary Relationships*, Society for Experimental Biology and Medicine, Southern California and Pacific Coast sections (100); Section O, *Water Supplies and Irrigation* (135).

Section P, *The Roles of Government, Industry, and the University in Basic Research* (120, 120); AAAS Cooperative Committee on the Teaching of Science and Mathematics, *The Crisis in Science Education* (104, 108); National Science Teachers Association, *Science Teachers Face Their Problems* (215, 269, 295); and *Research in Science Education* (196); *Recent Scientific Explorations in the West and Their Contributions to Natural History* arranged by the American Nature Study Society (163).

Although vigorous attempts were made to schedule programs in a given field of specialized interest to avoid conflicts, it was inevitable that most individuals attending the meeting had to choose, each half-day, among several sessions in which they were interested. The aforementioned symposiums competed not only with one another, in many instances, but also with a variety of other sessions and events. Each program chairman, however, had the satisfaction of realizing that the audience at his session chose his program in preference to all the others available at the same time. An idea of the number of alternatives, occurring principally on the four days, 27–30 Dec., inclusive, may be gained from Table 1.

Analysis of sessions. A comparison of the types of sessions primarily sponsored by AAAS sections and by the societies (there were, of course, many instances of joint sessions of sections, of societies, and of sections *and* societies) indicates, as might be expected, that the societies tend to arrange more sessions for contributed papers

Table 1. Analysis of sessions of the Berkeley meeting.

Sessions for contributed papers	97
Sessions for symposiums, panels, etc.	137
Round-table sessions	15
Business sessions	45
Meal functions (many with addresses)	45
Other sessions with addresses	29
Total sessions	368

Table 2. Comparison of AAAS-sectional and societal programs.

Item	AAAS and its sections and conferences	Societies	Total no. sessions with papers	Total no. papers
Sessions for contributed papers	33 (by 10 sections), 216 papers	64 (by 17 societies), 518 papers	97	734
Sessions for symposiums, groups of invited papers, panels	52 (including 13 sections), 217 papers	85 (by 30 societies), 405 papers	137	622
Additional papers of listed discussants	25 papers	15 papers		40
Addresses and lectures	13 papers	32 papers	44	45
		Total	278	1441

than do the sections, which have shown a growing interest in planning symposiums. It may be noted, however, that 10 of the Association's 18 sections scheduled a total of 33 sessions for contributed papers at which 216 such papers were read. It is particularly interesting that, on the other hand, 30 of the participating societies arranged a total of 85 sessions that could be classified as symposiums or groups of invited papers with comprehensive titles. In the combined total of 1441 papers and addresses prepared (multiple authors and program chairmen were not counted) for the 121st meeting, 734, approximately one-half, were of the short or contributed type. At most large scientific meetings, the sessions are preponderantly or even exclusively devoted to short reports of current specialized research, not centered around an inclusive theme. A summary of the comparison between sectional and societal programs is given in Table 2.

Conferences. There are at present three recurrent conferences at AAAS meetings. The Academy Conference made up of the official delegates of the 42 academies of science affiliated with the Association and others interested in academy affairs had a fruitful day of reports and round-table discussions, an afternoon address on the National Science Talent Search by Margaret Patterson, and a dinner with a presidential address by Wayne Taylor. The enlarged Ninth Junior Scientists Assembly, under the auspices of this conference, is mentioned in a preceding paragraph. The Conference on Scientific Manpower met at Berkeley for the fourth time on an organized basis. The third Conference on Scientific Editorial Problems increased its sessions to four. The First International Conference on Animal Venoms, cosponsored by AAAS Sections F and N, had eight sessions at which 65 papers from 14 countries were read, many of them necessarily in absentia. The attendance at this highly specialized conference ranged from 12 to 67 with an average of 31.

Special sessions. The distinguished evening addresses that add so much to meetings of the Association each year were continued at Berkeley and, without exception, all enjoyed large and responsive audiences. In chronological order, the speaker for the National Geographic Society's annual lecture and color motion picture was W. Robert Moore; his subject, "Five-star Burma," was enjoyed by some 3400 persons in the Berkeley High School auditorium. The 15th annual address of the United Chapters of Phi Beta Kappa with the AAAS was delivered by Conway Zirkle; his subject, "Our splintered learning and the status of scientists," provocatively phrased, was an eloquent plea for a much broader and better integrated foundation in the liberal arts training of scientists. The AAAS presidential address, E. U. Condon's "A half-century of quantum physics," not only was a scholarly review of developments in this field but was enlivened by personal anecdotes that revealed how the author's own interest began. The annual address of the Society of the Sigma Xi, the latest in a series that began in 1922, was given by one of the University of California's own scientists, Nobel prize winner Edwin M. McMillan, who spoke on "High-energy physics." The seventh annual address of the Scientific Research Society of America, "Science and progress?" delivered by Vannevar Bush, dealt with science and national affairs, especially the need for a better system of national security. An additional special session at Berkeley was an afternoon address, 30 Dec., arranged by the Pacific Science Board. Alexander Spoehr's subject, "The human background of Pacific science," rounded out a brilliant series of public lectures at the Berkeley meeting.

AAAS business sessions. As required by the constitution, the Association's board of directors held its fourth regular meeting of the year at Berkeley; as usual its sessions preceded those of the AAAS council. The annual section officers' luncheon was well attended, and a good start was made on sectional plans for the Atlanta meeting.

Attendance. As mentioned previously, the 3856 paid registrations at the Berkeley meeting exceeded those of any year since the exceptional AAAS meeting of 1949 in New York (when a maximum number of societies that usually do not meet with the Association were present). This total is some 4 times the registration totals of the June meetings of the AAAS Pacific division. A geographic analysis of these registrants is given in Table 3.

Although the large and populous state of California provided three-fourths of the registrants, all sections of the nation were well represented. The only states without individual registrants were New Hampshire, South Carolina, South Dakota, and Vermont. Particularly gratifying was the attendance from the Atlantic seaboard, the Great Lakes area, and the southern states.

The *total attendance* of professional scientists, faculty members, other teachers, and graduate students at any national meeting of the Association is always greater than the number of paid registrations. This is due to a long-standing policy of the AAAS that all programs, from the semipopular evening addresses to the highly

technical paper-reading sessions or symposiums, should be open to all interested persons. Often this unpaid attendance is considerable. Some of the societies meeting with the AAAS maintain separate registrations and several may collect a fee of their own. It is understandable, in such instances, that some of the members of these societies may regard a double registration as onerous or superfluous. At Berkeley, if the unduplicated registrations of societies with separate registrations had been added, then almost certainly the AAAS registration total would have been at least 4500. In addition to the registration totals, there were 3612 science-minded persons who visited the Annual Exposition of Science and Industry, using complimentary tickets of admission. It may be conservatively estimated, therefore, that some phase of the Berkeley meeting was attended by approximately 10,000 individuals. Analyses of the subject fields of the registrants and of the additional visitors to the exposition is given in Table 4.

Although AAAS registration is not mandatory, as is true at the more homogeneous meetings of a single scientific discipline, the Association encourages and appreciates paid registrations, which are needed to assist with the finances of the meeting. The registration fee has been kept at the moderate figure of $2.50 so that lower-income teachers and students will find it possible to be completely a part of the meeting. A large majority of the 3856 registrants at Berkeley were AAAS members or members of the participating societies, but there was a gratifying number of others who demonstrated that they wished to support the meeting in this way, or who felt that the fee was well worth what it meant in return—a book-size General Program-Directory; posting in the Visible Directory of Registrants; an AAAS convention badge for admission to the Science Theatre, the Exposition, the Biologists' Smoker with its free refreshments and cigarettes, and the Morrison Planetarium of the California Academy of Sciences in San Francisco. For AAAS registrants who had their cars in Berkeley, the University of California thoughtfully provided special parking privileges.

Table 3. Distribution of registrants by states and countries.

Alabama	2	Texas	26
Arizona	26	Utah	48
Arkansas	3	Virginia	8
California	2904	Washington	100
Colorado	29	West Virginia	3
Connecticut	12	Wisconsin	25
Delaware	1	Wyoming	2
District of Columbia	39		
Florida	7	Total, continental U.S.	3786
Georgia	5		
Idaho	11		
Illinois	43	Alaska	3
Indiana	27	Australia	3
Iowa	18	Brazil	4
Kansas	9	Canada	23
Kentucky	3	Egypt	1
Louisiana	10	England	2
Maine	1	Formosa	2
Maryland	18	France	1
Massachusetts	28	Germany	1
Michigan	25	Hawaii	14
Minnesota	16	India	1
Mississippi	1	Israel	1
Missouri	8	Japan	1
Montana	9	Korea	2
Nebraska	9	Mexico	3
Nevada	21	Netherlands	1
New Jersey	11	Norway	1
New Mexico	21	Peru	1
New York	53	Philippines	1
North Carolina	9	South Africa	1
North Dakota	1	Spain	1
Ohio	22	Venezuela	2
Oklahoma	12		
Oregon	115	Total, territorial and foreign	70
Pennsylvania	31		
Rhode Island	5		
Tennessee	9	Total registration	3856

Physical arrangements. With the exceptions of the evening illustrated lecture of the National Geographic Society (in the auditorium of the Berkeley High School), the Ninth Annual Junior Scientists Assembly (at San Francisco State College), the program of Beta Beta Beta (Trinity Methodist Church), the programs of Section P, and the annual conventions of the Society of Sigma Xi and the Scientific Research Society of America (at the Hotel Claremont), and some of the meal functions of the participating societies, all sessions of the 121st meeting were held in classroom buildings on the campus of the University of California. Fifty-eight session rooms were used, all stocked at the beginning of the week with whatever equipment had been requested. Some 90 percent of these had two sizes of lanterns; a number had 16-mm motion picture projectors. Two projectors of the arc type were particularly helpful for the 3-D film, *Status of Photo-Interpretation in Petroleum Geology*, and in program V of *Science in the Arctic*, which preceded the Biologists' Smoker. An additional 14 rooms for meals and social functions, 9 rooms for committee meetings, and 4 for headquarters rooms were employed.

The centrally located, large Gymnasium for Men was an admirable center for the entire meeting. The lobby contained the AAAS Registration and Information Centers and the main corridor next to it afforded space for a variety of tables for society registrations, room assignments in the residence halls, sale of tickets for meal functions, signing up for tours, and the like. Unprecedentedly for a nonuniversity event, the basketball floor, carefully covered with a heavy tarpaulin, housed the Annual Exposition of Science and Industry. Large rooms near the exhibit housed a lounge, in which light refreshments were available, and the Visible Directory of Registrants, and check room. The AAAS Science Theatre occupied a room at the other end of the central corridor. For this, excellent projection facilities were provided; and, typical of the thoughtfulness and thoroughness of the Committee on Physical Arrangements, those attending the theatre enjoyed comfortable leather-covered seats, which came from virtually every faculty office in the university. Not only did the Department of Physical Education cheerfully evacuate an entire suite of offices for the AAAS Office, but a number of its staff offered whatever else might be needed. The AAAS Office began full operation the morning of 22 Dec. Despite a basketball game on the night of 22 Dec., all facilities of the Gymnasium for Men were set up by 5 P.M. 23 Dec.

For the convenience of all, the California Alumni Association made available its new building and lounge as a place in which to meet or to rest. Campus tours for visiting ladies were arranged here with faculty wives in charge.

Housing facilities. Although, of necessity, every visitor

Table 4. Attendance by subject fields.

Subject	3856 registrants	3612 complimentary admissions
Mathematics and statistics	197	81
Physical sciences		
Physics	258	394
Meteorology	32	6
Astronomy	75	54
Chemistry	345	287
Geology and geography	67	49
Engineering and industrial science	118	291
Biological sciences		
Plant pathology and mycology	68	18
Other botanical sciences	179	45
Ecology	60	
Limnology, oceanography, ichthyology	59	8
Genetics and cytology	64	10
Microbiology	51	7
Zoological sciences	374	107
Biology (in general, and other)	244	126
Agriculture and conservation	91	67
Medical sciences		
Bacteriology and virology	61	42
Biochemistry and nutrition	206	45
Biophysics	36	7
Physiology	108	18
Dental research	34	11
Pharmacy, pharmacology, toxicology	55	15
Medicine (in general, and other)	257	175
Psychology	156	67
Anthropology	43	25
Economic and social sciences	56	164
History and philosophy of science	18	32
Science teaching and education	209	293
Scientific editorial problems	43	22
General	292	794
No field indicated		352
Total	3856	3612

could not enjoy a single room (relatively scarce at any convention), the hotels and motels of Berkeley, in conjunction with the university residence halls and International House, proved adequate housing accommodations for those who traveled to the meeting beyond commuting distance. An admirable job of processing the many applications for housing accommodations was done by the staff of the Convention Bureau of the Berkeley Chamber of Commerce, headed by Weldon E. Vance. His help in this and throughout the year is gratefully acknowledged.

AAAS Public Information Service. The AAAS Press Room utilized the facilities of *The Daily Californian* in Eshleman Hall. Those who visited this busy room during the meeting gained some impression of the efficient way in which science writers and other reporters were provided with releases during the meeting by Sidney S. Negus, AAAS Director of Public Information, whose full-time job the rest of the year is chairman, department of biochemistry, Medical College of Virginia. Negus reports:

"The University of California furnished ideal facilities for the world-wide reporting of the news of the meeting. Daniel M. Wilkes, science writer in the university's department of public information, started to set the stage for the complicated operation 4 months before the 121st meeting began. The secretaries and program chairmen of the 18 AAAS sections and the 90 participating societies cooperated fully, as did the 1750 persons on the program and the Association's presidents, Condon, Weaver, and Beadle. When the meeting got under way, Maynard T. Morris, head of public information for the university, and Richard H. Neddersen, acting business manager, helped greatly.

"One hundred twenty-two reporters representing the press, radio, and television covered the meeting directly from the campus. All American and several foreign wire services and leading news magazines were represented. Eighty-eight other individuals in the United States and abroad reported the meeting from abstracts and papers mailed to them. Coverage by the West Coast newspapers and broadcasting stations was exceptionally good. Reports of the meeting must have been widely distributed outside the West Coast area, since reporters filed approximately 70,000 words by Western Union wires alone. Many of these wire reports were relayed to news outlets in every country on the globe for millions of people to read. In addition, many pictures taken at Berkeley during the week were received by wire in newspaper offices everywhere.

"Active members of the National Association of Science Writers present at the meeting and representatives of West Coast newspapers and magazines were entertained most hospitably by President and Mrs. Robert Gordon Sproul at the Bohemian Club in San Francisco, by Mr. and Mrs. Henry J. Kaiser, Jr., at their home in Oakland, and by Robert Cutter at the Claremont Hotel in Berkeley. Freshly crushed orange juice was served continuously in the Press Room for the 6 days of the meeting by Sunkist Growers. Lunches were served the press each day by the American Tobacco Co. Research Laboratory of Richmond, Va., Noyes and Sproul, Inc., of New York, and Sunkist Growers of Los Angeles. The General Electric Research Laboratory of Schenectady, N.Y., held its usual "open house" every evening at the Shattuck Hotel in Berkeley. The Association is grateful to these individuals and organizations for making the public information function of the meeting so pleasant.

"Three Nobel prize winners, Edwin M. McMillan, Glenn T. Seaborg, and Wendell M. Stanley kindly served as Press Room consultants. George C. Tenney of McGraw-Hill Publishing Co., chairman of the local committee on public information, assisted in many ways. Nancy Kern of Berkeley handled in superior fashion the 25 radio and television programs that she set up on public service time. Several of these programs were broadcast coast-to-coast. Associates in the Press Room were Thelma C. Heatwole of Staunton, Va., and Margaret Blaney of San Francisco, with Wayne Taylor of Denton, Tex., in charge of photography. These individuals and the other five Press Room assistants were of invaluable aid in serving reporters to whom, more than to any others, goes the credit for helping to make possible the fulfillment of one of the principal objectives of the AAAS—to increase public understanding and appreciation of the importance and promise of the methods of science in human progress."

Reports and news of the Berkeley meeting in magazines will continue to appear during the year. One of the first of these was the initial six pages of *Life* for 10 Jan. 1955.

AAAS Science Theatre. Beginning Monday morning, 27 Dec., and ending Thursday afternoon, 30 Dec., in eight programs, each 4 hours long, 47 of the latest foreign and

domestic scientific films were presented. Each title was shown twice, with two exceptions of films shared with AAAS sections and for which other films were substituted. Through the kind cooperation of a faculty member, the number of persons present at each showing of each film was recorded. On the first day attendance began with 20 persons but climbed to 115 by 11 A.M. Thereafter, the audiences ranged principally from 75 to 160 and on Thursday afternoon reached maxima of 220 with *The Transistor* and 250 with *The Dances of the Bees* of Karl von Frisch. The average attendance was exactly 100—excellent, considering the large number of attractive concurrent sessions. It was noted that afternoon audiences exceeded those of the mornings and that, on the last day, the attendance was substantially heavier than on the preceding days. *The Bronchopulmonary Segments* of Chevalier L. Jackson, John F. Huber, and Charles Norris was not completed in time (it will be shown at the Atlanta meeting). Substituted for it was *Seifriz on Protoplasm* produced by J. M. B. Churchill, Jr., of Croton-on-Hudson, N.Y. The Association again expresses its appreciation to those who so kindly lent such excellent films.

Annual Exposition of Science and Industry. The 1954 Annual Exposition of Science and Industry was a decided success in the opinion of the exhibitors, who are the final judges. Because of a combination of circumstances—a scheduled basketball game on the evening of 22 Dec. and the observance of 24–26 Dec. as general holidays for all labor concerned—it was necessary for the university help to install the protective tarpaulin immediately after the game ended, and for the decorator, the J. L. Stuart Manufacturing Co. of San Francisco, to erect the 105 booths early on 23 Dec. By 5 P.M. that day many of the exhibits had been installed; the balance were done on the morning of 27 Dec. For an hour prior to opening time that afternoon, people had gathered before the entrance door. When 2 P.M. arrived, people radiated out through all the aisles, as one observer put it, "like logs filling a mill pond when a lumber drive is on." Thereafter, during the 4 days the exhibits were open, booth traffic was heavy and satisfactory. The visitors were seriously interested in the latest tools and techniques of science and industry, and the exhibitors were pleased with their response.

The names of most of the 66 exhibitors and descriptions of their exhibits appeared both in the General Program-Directory and in the preconvention issue of *Science*. Those that did not are listed here.

Alameda Naval Air Station
California State Department of Public Health (Sponsored by the Kaiser Steel Corp.)
Crown Zellerbach Corp.
Encyclopaedia Britannica, Inc.
Great Books of the Western World
Hazatrol, Inc.
Natcol Laboratories
University of California History of Science Library
University of California Press

As in past years, we are indebted to the Special Libraries Association, this time the San Francisco Chapter, for supervising the Science Library.

Work of the local committees. The Berkeley meeting enjoyed both exceptional physical facilities and the efficient services of many skilled persons. It is not an exaggeration that literally all the resources of the great University of California were placed at the disposal of the Association by the general chairman of the meeting, Robert Gordon Sproul. This meant not only classrooms, gymnasiums, residence halls, and cafeterias but also highly trained men and women at all levels. Sproul, who accepted the general chairmanship in 1953, appointed the several local committees early in 1954 and, with the assistance of the executive secretary, George A. Pettitt, he kept in close touch with their work. The complete list appeared in the preconvention issue of *Science*. It was obvious to those in attendance that all phases of the meeting were operating with unequaled smoothness. In a very large measure, this was due to the caliber of the Committee on Physical Arrangements and the degree of planning, supervision, and personal assistance all its members contributed. Particular mention is made of this committee's chairman, Richard H. Neddersen, acting business manager of the university, for he chose his fellow-members carefully, organized all details soundly, and, when the meeting began, virtually moved into the AAAS Office, where he solved a multitude of small vexations systematically and with expedition. He was ably assisted by Joseph W. Hutchison, principal superintendent of grounds and buildings, and J. E. Lateana, principal audio-visual specialist, who, respectively, supervised the supply of physical equipment and projection. Ruth N. Donnelly, housing supervisor, not only organized the use of the residence halls but assisted materially with the AAAS reception and other social aspects of the meeting.

Sidney Negus in his report has testified to the services of the Committee on Public Relations. The extent of the contribution of this committee was apparent to all who visited the press headquarters or read the newspapers of the Bay area.

The Committee on Exhibits, under the chairmanship of Robert K. Cutter, president of Cutter Laboratories, worked hard from March on, to interest local industries in taking booth space. To this committee and Arthur K. Beckley of Cutter Laboratories, which absorbed all costs for local promotion of the exposition, goes the credit for securing representation from so many West Coast firms.

The Committee on Finance, with James B. Black, president of the Pacific Gas and Electric Co., as chairman, fully realized its objectives in raising funds to assist with the expenses of the meeting. Because the location of the meeting was more distant than usual, the Berkeley meeting was faced with a larger potential deficit. With D. M. Sheldon, and later J. W. Givens, both of Shell Development Co., serving as informal secretaries, public-spirited firms of the San Francisco Bay area began as early as 1951 to make pledges and contributions that totaled about half of the estimated sum needed. In September 1954, the Committee on Finance began to collect all early pledges and then secured a further sum that constituted more than half of the final total. The contributing firms were:

Allied Chemical and Dye Corp., General Chemical Division
American Forest Products Co.
American Trust Co.
Bakelite Co.
Bank of America
Bechtel Corp.
Bishop Oil Co.
Braun-Knecht-Heimann Co.
California and Hawaiian Sugar Refining Corp.
California Packing Corp.
Calveras Cement Co.
Carbide and Carbon Chemicals Co.
Columbia-Geneva Steel Division, U.S. Steel Corp.
Crown Zellerbach Corp.
Dean Witter and Co.
Dow Chemical Co.

Electro-Metallurgical Co.
Fibreboard Products, Inc.
Food Machinery and Chemical Corp.
General Electric Co.
General Metals Corp.
Haynes Stellite Co.
Henry J. Kaiser Co.
Hercules Powder Co.
Honolulu Oil Corp.
Ideal Cement Co.
Johns-Manville Corp.
Kaiser Aluminum and Chemical Corp.
Kaiser Engineers
Kaiser Steel Corp.
Kern County Land Co.
Levi Strauss and Co.
Linde Air Products Co.
Monsanto Chemical Co.
National Carbon Co.
Pabco Products, Inc.
Pacific Gas and Electric Co.
Pacific Telephone and Telegraph Co.
Permanente Cement Co.
Schlage Lock Co.
Shell Oil Co.
Spreckels Sugar Co.
Standard Oil Company of California
Stauffer Chemical Co.
Union Oil Company of California
Westinghouse Electric Corp.

To these should be added contributions made by the Hotel Claremont of Berkeley and by the United-Carr Fastener Corp. of Cambridge, Mass., the latter made to the AAAS for any worthy purpose and applied to the Berkeley meeting. The Association gratefully acknowledges these contributions and expresses its deep appreciation to all members of the local committees for their services.

Awards and Prize Winners at the Berkeley Meeting

AAAS 27th Newcomb Cleveland Prize of $1000—Daniel H. Alpert, research physicist, Westinghouse Electric Corp., for his paper, "Experiments at very low pressures," read before a joint session of the American Physical Society and Section B; presented 30 Dec.

AAAS 10th Theobald Smith Award in the Medical Sciences, given by Eli Lilly and Co.—$1000, a bronze medal, and $150 travel expenses—Winston Harvey Price, associate professor of biochemistry, School of Hygiene and Public Health, Johns Hopkins University, for his epidemiological studies on Rocky Mountain spotted fever and typhus; presented in absentia at a session of Section N, 27 Dec.

Scientific Research Society of America—4th William Procter Prize of $1000—Vannevar Bush, president, Carnegie Institution of Washington, for scientific achievement and distinction in scientific administration; presented at the annual RESA address, 30 Dec.

Cranbrook Institute of Science—Mary Soper Pope medal—Irving W. Bailey, professor of plant anatomy, Harvard University, for distinguished work in botany; presented at the botanists' dinner sponsored by Section G and cosponsored by the American Society of Plant Physiologists, western section, the Botanical Society of America, Pacific section, and the Mycological Society of America.

John Scott Award—Robley C. Williams, research biophysicist, Virus Laboratory, University of California; presented at the end of the symposium on "Viruses" of Section C and the American Chemical Society, California section.

The 1954 Meeting of the Council of the AAAS

Dael Wolfle

Administrative Secretary

The 1954 meeting of the Council was held in two sessions, at 4 P.M. on 27 December and at 9 A.M. on 30 December. Both sessions were held on the campus of the University of California at Berkeley. President Warren Weaver presided.

Elections and Officers

1) The Council elected Paul B. Sears as President Elect, and Chauncey D. Leake and Margaret Mead as members of the Board of Directors. The entire list of general officers of the Association (those elected by the Council), including those elected at earlier meetings, is as follows. (Expiration dates are given in parentheses following the names of officers who serve for fixed terms of more than one year.)

Retiring President and Cairman of the Board of Directors: Warren Weaver (1955), Rockefeller Foundation

President: George W. Beadle (1956), California Institute of Technology

President Elect: Paul B. Sears (1957), Yale University

Other Members of the Board of Directors

John R. Dunning (1955), Columbia University
Laurence H. Snyder (1955), University of Oklahoma
Mark H. Ingraham (1956), University of Wisconsin
Paul E. Klopsteg (1956), Glenview, Illinois
Wallace R. Brode (1957), National Bureau of Standards
Thomas Park (1957), University of Chicago
Chauncey D. Leake (1958), University of Texas Medical Branch, Galveston
Margaret Mead (1958), American Museum of Natural History
Paul A. Scherer (ex officio), Carnegie Institution of Washington
Dael Wolfle (ex officio), AAAS

Vice Presidents and Chairmen of the Sections for 1955

A Mathematics: H. F. Bohnenblust, California Institute of Technology
B Physics: Alan T. Waterman, National Science Foundation
C Chemistry: Robert S. Ingols, Georgia Institute of Technology
D Astronomy: Seth B. Nicholson, Mount Wilson Observatory
E Geology and Geography: Carl Tolman, Washington University
F Zoological Sciences: J. Gordon Carlson, University of Tennessee
G Botanical Sciences: Lawrence R. Blinks, National Science Foundation
H Anthropology: W. Montague Cobb, Howard University
I Psychology: S. S. Stevens, Harvard University
K Social and Economic Sciences: Conrad Taeuber, Bureau of the Census
L History and Philosophy of Science: Raymond J. Seeger, National Science Foundation
M Engineering: Clarence E. Davies, American Society of Mechanical Engineers
N Medicine:
Nd Dentistry: H. Trendley Dean, American Dental Association
Np Pharmacy: Glenn L. Jenkins, Purdue University
O Agriculture: John Fielding Reed, American Potash Institute
P Industrial Science:
Q Education: Carter V. Good, University of Cincinnati

Administrative Officers

Appointed by the Board of Directors

Administrative Secretary and Acting Editor: Dael Wolfle
Associate Administrative Secretaries: Raymond L. Taylor and John A. Behnke
Business Manager: Hans Nussbaum
Assistant Editor: Charlotte V. Meeting

Secretaries of the Sections

A Mathematics: Rudolph E. Langer (1956), University of Wisconsin, Madison
B Physics: Fred L. Mohler (1955), National Bureau of Standards, Washington, D.C.
C Chemistry: Ed. F. Degering (1956), Quartermaster Research and Development Laboratories, Natick, Mass.
D Astronomy: Frank K. Edmondson (1957), Indiana University, Bloomington
E Geology and Geography:
F Zoological Sciences: Harold H. Plough (1955), Amherst College, Amherst, Mass.
G Botanical Sciences: Barry Commonor (1955), Washington University, St. Louis, Mo.
H Anthropology: Gabriel Lasker (1957), University of Wisconsin, Madison
I Psychology: William D. Neff (1956), University of Chicago, Chicago, Ill.
K Social and Economic Sciences: Donald P. Ray (1958), George Washington University, Washington, D.C.
L History and Philosophy of Sciences:
M Engineering: Frank D. Carvin (1956), Illinois Institute of Technology, Chicago, Ill.
N Medicine: Allan D. Bass (1956), Vanderbilt University School of Medicine, Nashville, Tenn.
Nd Dentistry: Russell W. Bunting (1958), University of Michigan, Ann Arbor
Np Pharmacy: John E. Christian (1958), Purdue University, Lafayette, Ind.
O Agriculture: F. D. Keim (1957), University of Nebraska College of Agriculture, Lincoln
P Industrial Science: Allen T. Bonnell (1956), Drexel Institute of Technology, Philadelphia, Pa.
Q Education: Dean A. Worcester (1956), University of Nebraska, Lincoln

Officers of the Pacific Division

President: Edwin R. Guthrie, University of Washington, Seattle
President Elect: Robert B. Brode, University of California, Berkeley
Retiring President: A. H. Sturtevant, California Institute of Technology, Pasadena
Secretary: Robert C. Miller, California Academy of Sciences, San Francisco
Council Representative: A. H. Sturtevant, California Institute of Technology

Officers of the Southwestern and Rocky Mountain Division

President: Joe Dennis, Texas Technological College, Lubbock
Vice President: E. F. Castetter, University of New Mexico, Albuquerque
Secretary and Council Representative: Frank E. E. Germann, University of Colorado, Boulder

Officers of the Alaska Division

President: Neil W. Hosley, University of Alaska, College, Alaska
Vice President: John A. Dassow, Fisheries Products Laboratory, USFWS, Ketchikan, Alaska
Secretary: Arthur Buswell, Extension Service, College, Alaska
Council Representative: Troy L. Péwé, U.S. Geological Survey, College, Alaska

Affiliated and Associated Societies

2) Upon recommendations by the Committee on Affiliation and Association and the Board of Directors, the Council voted to elect nine new affiliates, to change one associated society to an affiliated society, and to elect one new associate.

New Affiliates

American College of Chest Physicians
American Ornithologists' Union
American Physical Therapy Association
Association of Geology Teachers
Endocrine Society
Instrument Society of America
National Association for Research in Science Teaching
Radiological Society of North America, Inc.
Scientific Research Society of America

Changed from Associate to Affiliate Status

American Dairy Science Association

New Associate

National Association of Boards of Pharmacy

During 1954 two affiliated societies merged. At the end of the year the figures on affiliated and associated societies were

Affiliated Societies	163
Affiliated Academies of Science	42
Associated Societies	53
Total	258

Changes in Bylaws

3) Changes in the Association's bylaws may be made by the Board of Directors but are subject to approval by the Council. The Council approved the following changes. (New material is in italics.)

Article VI, Section 3: The Southwestern *and Rocky Mountain* Division (organized in 1920) includes members of the Association resident in Arizona, New Mexico, Colorado, Wyoming, Montana east of the Continental Divide, Sonora, Chihuahua, and Texas west of the 100th meridian.

Article VI, Section 4: The Alaska Division (organized in 1951) includes members of the Association resident in Alaska *and others who meet such requirements as may be established by the Division and approved by the Board of Directors.*

Article VI, Section 5: Each division shall receive for its expenses an annual allowance not to exceed one dollar for each of its members *who is an AAAS member* in good standing, *or three hundred dollars ($300) whichever is larger,* and shall make an annual report to the Board of Directors covering its financial situation and other activities.

4) At the time of the 1953 meeting, the constitution and bylaws under which the Association operates had been in effect for 1 year. In order to secure a general review and in order to correct some difficulties, a special committee on Constitution, Bylaws, and General Operations was authorized at the 1953 meeting. The chairman, Wallace R. Brode, presented a preliminary report in which he described the nature of the changes that the committee had considered and asked for advice and recommendations from the Council. The discussion led to agreement that the committee would propose specific changes for action in 1955.

Resolutions

5) Upon recommendation by the Board of Directors, the Council approved the following statement concerning government grants for unclassified research in which problems of national security are not involved:

> There is growing concern over the procedures under which scientists are judged worthy of receiving federal money for unclassified research which does not involve problems of national security. It is understood that this matter is being studied by representatives of government agencies.
>
> The Board of Directors of AAAS and its Council urge the adoption of a uniform policy by all government agencies making grants for, or otherwise supporting, unclassified research. Specifically they recommend adoption of the policy under which the National Science Foundation operates in awarding grants for unclassified research.
>
> Under that policy, appraisal of merit of a proposal is based on the experience, competence, and integrity of the investigator, as judged by a panel of competent scientists who have a working knowledge of his qualifications.
>
> However, certain persons are excluded from financial support by the National Science Foundation. It will not knowingly make or continue a grant to a person who is an avowed Communist or who has been established through judicial proceedings as being a Communist. Neither will it make a grant to anyone who avowedly advocates change in the United States Government by other than constitutional means, or to one who has been convicted of sabotage, espionage, sedition, or any similar crime involving the nation's security.
>
> Thus, the policy excludes certain classes of individuals from receiving public funds for research, even though this research is unclassified. Such exclusion is based only upon due process of law. Except in cases of persons thus excluded, appraisals as to worthiness of applicants to receive government funds are made by qualified individuals exclusively upon positive criteria of experience, scientific competence, and integrity of the applicant.

6) The Committee on Resolutions reviewed and reported to the Council on a number of resolutions that had been proposed by individuals or other groups. The following resolution was recommended by Section Nd (Dentistry) and was endorsed by the Council:

> Whereas "the objects of the American Association for the Advancement of Science are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress" and
>
> Whereas fluoridation of community water supplies is repeatedly demonstrating that it is an effective public health measure for the mass partial control of dental caries, and
>
> Whereas fluoridation is soon to enter its eleventh year as a widely endorsed public health program, and
>
> Whereas fluoridation was endorsed by Nd Section at the annual meeting of the AAAS in 1952,
>
> Now, therefore, be it resolved that Nd Section (Section on Dentistry) request the Council of the Association, through the Board of Directors, through the Administrative Secretary, to go on record as endorsing fluoridation of community water supplies as a method for advancing dental public health, at this 121st meeting of the AAAS.

7) With respect to a series of recommendations proposed by the Association of Scientific Workers, the Committee on Resolutions reported as follows:

> A memorandum to the Council of the AAAS by the Association of Scientific Workers has been referred to the Committee on Resolutions for consideration. The memorandum has three sections dealing with (i) thermonuclear weapons tests; (ii) the

training of scientists; (iii) restrictions on travel of foreign scientists to the U.S.

The memorandum of the A.Sc.W. should be read by every member of the Council. Each of the matters presented has received brief consideration by the committee, and our recommendations concerning them are presented in reverse order. With respect to restrictions on travel by foreign scientists due to the provisions of the Walters-McCarran Act, the AAAS Council has already taken a firm position in its resolution of two years ago, and in the subsequent activities of its secretary. A new resolution does not seem desirable.

The urgency of the problems concerned with the training of younger scientists is recognized in the program at the current Berkeley meeting. No good purpose would appear to be served by a resolution at this time.

Finally, there is the recommendation from the A.Sc.W. that the Council of AAAS go on record as favoring the ban on all tests of atomic weapons, and in particular the thermonuclear variety. The basic scientific facts on which conclusions on these questions could be drawn are not publicly available, and it appears that issues are involved which go beyond the scientific facts alone. The committee therefore does not favor a resolution at this time.

These recommendations were approved by vote of Council.

8) The members of the Committee on Resolutions, acting as individuals rather than in their capacity as a committee, moved the creation of a committee of the Association, to be appointed by the Board of Directors, to collect the facts on the possible biological effects of thermonuclear weapons, as recommended by A.Sc.W., and to report at a later date. Council voted to create such a committee.

9) The Committee on Resolutions proposed the following resolution of thanks to those who had been instrumental in making the Berkeley meeting the outstanding occasion that it was. The resolution was enthusiastically approved by Council.

At the close of the 121st meeting of the AAAS, the first national winter meeting to be held west of the Rocky Mountains, the Council wishes to express its grateful thanks and appreciation to the Local Committee, to the University of California at Berkeley, and to all the professional and business people associated with them in planning and holding the meeting. The physical arrangements have been admirably handled, and the large attendance from every section of the United States has felt the genuineness and warmth of the welcome. Our members will return to their laboratories and their homes with a renewed respect for the competence and the cordiality of their fellow-scientists on the Berkeley campus and with an increased consciousness of the strength and unity of purpose of science throughout the United States as shown in the Berkeley meeting.

Other Business

10) The National Citizens Committee for Educational Television presented the Association with a citation for its assistance in advancing the cause of educational television. On behalf of the Association, the citation was received by John A. Behnke, Associate Administrative Secretary.

11) Council discussed at some length possible alternative methods of electing the Association's President Elect. Consideration was given to the question of whether election should continue to be by the Council or should be broadened so that all Fellows, or perhaps even all members, would have the privilege of voting. Also discussed were methods of securing more extended consideration of the candidates from among whom the Council would select a President Elect, as were methods of securing votes from a larger fraction of the Council than is usually present at an annual meeting. After discussion of several specific proposals, none of which came to vote, it was agreed that the problem should be considered by the Committee on Constitution, Bylaws, and General Operations, and that at the 1955 meeting the Board of Directors should submit one or two specific proposals for Council consideration.

12) The chairman of the Association's Building Committee, John R. Dunning, described the headquarters building that the Association plans to erect and indicated that construction will start about the first of April 1955. In a discussion of the financing of the new building, it was pointed out that most of the cost could be met from the surplus of income over expenses in prior years.

13) The chairman of the Publications Committee, Paul B. Sears, reported that Duane Roller, who served as editor of *Science* and the *Scientific Monthly* since December 1953, had resigned, and that pending the completion of more permanent editorial arrangements, the Board of Directors had asked the Administrative Secretary to serve as Acting Editor.

America's first need is leaders who can think accurately and with confidence.—W. E. WELD.

Association Finances and Membership

Hans Nussbaum

Business Manager, AAAS

Condensed statements of Association finances for the year 1953, prepared by the auditing firm of G. P. Graham & Company, are published herewith, in order that the entire membership may be fully informed regarding the financial operations, obligations, and resources of the AAAS.

The first two statements summarize operating receipts and expenditures. Once again the annuity payments to the Cattell estates for *Science*, were drawn from the excess of receipts over expenditures in the operating account. Final annuity and inflation clause payments, made in 1954, amounted to $1767.13.

The last two statements summarize the status of investment and trust funds. The value of investments and the amount of investment income both increased in 1953, thanks to sound investment policies and management, but the total endowment is still meager in comparison with the magnitude of the responsibilities the Association should assume in advancing science.

Current plans call for the publication during 1955 of financial reports covering the year 1954.

May 21, 1954
Washington 5, D.C.

To the Council of the
American Association for the Advancement of Science
Washington, D.C.

We have examined the balance sheet of the Operating Fund of the American Association for the Advancement of Science as at December 31, 1953, and the statement of receipts and expenditures for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying statements as supplemented by the notes thereto present fairly the financial position of the Operating Fund of the American Association for the Advancement of Science as at December 31, 1953, and the results of its operations for year then ended.

G. P. GRAHAM & COMPANY

BY H. A. O'NEILL

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

OPERATING FUND

BALANCE SHEET AS AT DECEMBER 31, 1953

Assets

Current assets		
Cash in banks	$201,899.88	
Accounts receivable	17,603.44	
U.S. Treasury bills	547,852.58	
U.S Treasury certificates of indebtedness	35,000.00	
U.S. Treasury bonds	98,031.25	$900,387.15
Other assets		
Deposit with airline		425.00
		$900,812.15

Liabilities

Current liabilities		
Accounts payable		$ 63,405.69
Deferred income		
Prepaid dues and fees	$217,955.27	
Prepaid journal subscriptions	52,741.78	
Contributions 1954 meeting	1,250.00	271,947.05
Reserve fund		250,000.00
Unallocated funds		
Balance January 1, 1953	$245,599.09	
Add: Excess of receipts over expenditures	69,860.32	
Balance December 31, 1953		315,459.41
		$900,812.15

Note: The journal *Science* was acquired in 1944 at a stated cost of $166,430.69, payable over a period of 10 years, together with such additional amounts as may be determined each year under the inflation clause of the contract. Total payments to December 31, 1953, amounted to $268,065.69. No liability has been shown on the foregoing statement for the balance of $924.91 which is payable on the stated cost price of the journal.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

OPERATING FUND

STATEMENT OF RECEIPTS AND EXPENDITURES FOR THE YEAR ENDED DECEMBER 31, 1953

Receipts			
Dues and entrance fees			$283,314.67
Journals			
Subscriptions			
From Treasurer's accounts (Life, 50-year and emeritus members)	$ 3,168.00		
Members special subscriptions	18,176.30		
Nonmember subscriptions	62,889.42	$ 84,233.72	
Advertising		152,277.38	
Miscellaneous sales		2,624.45	239,135.55
Publications			
Binders		$ 1,391.05	
Symposium volumes		5,615.24	
Proceedings and directory		346.75	7,353.04
Boston meeting and exhibit			41,515.00
Rental income			6,768.00
Income from investments			15,757.04
Miscellaneous			1,256.19
			$595,099.49
Expenditures			
Administrative and general expense		$ 85,136.42	
Building expense		9,705.70	
Board of directors		5,410.47	
Allowance to divisions		6,985.00	
Section expense		4,936.77	
Circularization—new members		14,152.21	
Meetings and exhibits		39,943.46	
Journals		309,616.78	
Publications		6,969.34	
Contributions		6,000.00	
Employees' retirement plan		2,123.11	
Social security		1,383.85	
Miscellaneous		1,290.90	
Annuity			
1953 Science annuity	$ 16,643.04		
Inflation allowance on annuity	14,942.12	31,585.16	525,239.17
Excess of receipts over expenditures			$ 69,860.32

AAAS Membership

1) *Changes during 1954*

Deaths	325
Resignations	1612
Automatic resignations	2625
Total outgoing	4562
New members	4419
New decrease during 1954	143

2) *Totals as of 31 December 1954*

Paid for 1954	33,372
Paid through June 1955	10,310
Life members, etc.	744
In good standing	44,426
In arrears	2,714
	47,140
New for 1955	1,520
Total membership	48,660

May 21, 1954
Washington 5, D.C.

To the Council of the
American Association for the Advancement of Science
Washington, D.C.

We have examined the balance sheet of the Treasurer's accounts of the American Association for the Advancement of Science as at December 31, 1953, and the statement of cash receipts and disbursements for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying financial statements present fairly the financial position of the Treasurer's account of the American Association for the Advancement of Science as at December 31, 1953, and the cash receipts and disbursements for the year then ended.

G. P. GRAHAM & COMPANY
BY H. A. O'NEILL

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

TREASURER'S ACCOUNTS

BALANCE SHEET AS AT DECEMBER 31, 1953

Assets

Endowment and reserve funds			
Securities			$347,138.18
Building fund			
Dues from other funds		$ 25,981.41	
Real estate			
1515 Massachusetts Avenue	$ 59,334.15		
Other	93,963.05	153,297.20	179.278.61
Newcomb Cleveland prize fund			
Securities			25,605.93
Current funds			
Cash		$ 14,305.30	
Due from other funds		13,537.33	27,842.63
			$579,865.35

Liabilities and Reserves

Endowment and reserve funds			
Due to other funds		$ 39,125.76	
For research	$123,666.15		
For general funds	107,251.32		
For special purposes	9,025.00		
Treasurer's reserve fund	68,069.95	308,012.42	$347,138.18
Building fund			179,278.61
Newcomb Cleveland prize fund			
Due to other funds		$ 392.98	
Principal of fund		25,212.95	25,605.93
Current funds			
Liabilities			
Academy grants	$ 3,603.51		
Special academy grants	550.00		
Sociology prize fund	3,000.00		
Westinghouse Science Writing Awards fund	279.58		
AAAS–UNESCO fellowship fund	53.50	$ 7,486.59	
Unappropriated income			
For research	$ 4,166.01		
For general purposes	3,594.83		
Jane M. Smith fund	298.67		
Luella A. Owen fund	16.98		
A. G. Stillhamer fund	663.86		
Unexpended balances of previous years	11,615.69	20,356.04	27,842.63
			$579,865.35

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

TREASURER'S ACCOUNTS

STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS FOR THE YEAR ENDED DECEMBER 31, 1953

Cash balances January 1, 1953			$ 37,642.18
Receipts			
Endowment and reserve funds			
Life membership fees	$ 2,850.00		
Income added to reserve fund			
Interest and dividends allocated	1,893.84		
Gain on sale of securities	10,379.82		
Redemption and sale of securities	251,255.16		
Gift—friends of the Association	38.50	$266,417.32	
Building fund			
Contributions	$ 35.00		
Interest and dividents allocated	519.63	554.63	
Newcomb Cleveland prize fund			
Income from investments	$ 1,214.02		
Sale of securities	57.81	1,271.83	
Current fund			
Contributions received for special academy grants	$ 400.00		
Westinghouse Science Writing Awards fund	6,945.19		
Income from investments	10,480.56		
Fees of deceased emeritus life members	600.00	18,425.75	286,669.53
			$324,311.71
Disbursements			
Endowment and reserve funds			
Fees of deceased emeritus life members transferred to Jane M. Smith fund income	$ 600.00		
Securities purchased	289,645.65	$290,245.65	
Building fund			
Miscellaneous expenses		198.63	
Newcomb Cleveland prize fund			
Thousand dollar prize	$ 1,000.00		
Securities purchased	212.82	1,212.82	
Current fund			
Westinghouse Science Writing Awards fund	$ 7,776.16		
Income allocated to Treasurer's reserve	1,893.84		
Income allocated to building fund	519.63		
Special academy grants	200.00		
Academy grants	3,473.29		
Emeritus life members (Income—Jane M. Smith fund)	900.00		
Journal subscriptions (life, 50-year and emeritus members)	3,168.00		
Expenses	418.39	18,349.31	310,006.41
Cash balance December 31, 1953			
Current fund			$ 14,305.30

I do not think we can maintain our position in the postwar world unless we are an exceptionally well-educated people and unless we can handle easily and with comprehension the problems and inventions of the new scientific age.—WINSTON CHURCHILL.

Reports of Sections and Societies, Berkeley Meeting

Section on Mathematics (A)

Section A enjoyed well-attended meetings. On 30–31 Dec., it met jointly with the American Mathematical Society. Eighteen papers were presented, and there were two invited addresses. These were on "Reflection laws for linear elliptic equations" by Hans Lewy (University of California, Berkeley) and on "Transition points in differential equations" by H. F. Bohnenblust (California Institute of Technology).

The section was cosponsor of almost all meetings of the *Third Berkeley Symposium on Mathematical Statistics and Probability*. These meetings, extending throughout the week, were devoted to mathematical statistics, to statistical mechanics, and to statistics in biology and genetics, medicine and public health, astronomy, and industrial research and psychology.

The section was also cosponsor of the programs on *Applications of Poisson and Exponential Distributions to Physics and Industry* and on *The Meaning of Probability to the Engineer, Mathematician and Physicist*, of the American Statistical Association—Committee of Statistics in the Physical Sciences.

By way of entertainment, the Institute of Mathematical Statistics held a beer party, of which the section was cosponsor, on Wednesday evening, and a Mathematics and Statistics dinner was given on Thursday evening. On the latter occasion the toastmistress was Mina Rees (Hunter College), chairman of Section A, and the speaker was C. B. Tompkins (University of California, Los Angeles). His subject was the organization of the problems of the Institute for Numerical Analysis. The newly elected chairman of Section A is H. F. Bohnenblust (California Institute of Technology).

RUDOLPH E. LANGER, *Secretary*

American Statistical Association (A2)

The American Statistical Association held a Western Regional Meeting, in conjunction with the 121st meeting of the AAAS, on 27–30 Dec. This was the first regional meeting to be held by the ASA on the Pacific Coast.

ASA was the sponsor or cosponsor of 16 separate sessions, which covered a wide variety of subjects, as follows: "Statistics in biology and genetics"; "Applications of poisson and exponential distributions to physics and industry"; "Regional unemployment estimates"; statistical mechanics"; "Regional indexes of business activity"; "Statistics in medicine and public health"; Reliability of complex systems"; "Statistics in astronomy—The spatial distribution of galaxies"; "Probability and induction"; "Pacific coast population trends"; "Statistics in astronomy—The distribution of stars in the Hertzsprung-Russell diagram"; "Mathematical statistics"; "Statistics in industrial research"; "Statistics in psychology"; "The meaning of probability to the engineer, mathematician, and physicist—panel"; "Social structure of cities." A session on regional economic analysis originally scheduled was canceled after the program was printed.

Attendance in the various sessions ranged from 25 to 270. Statisticians from all parts of the country registered for the meeting. It is the general consensus of those who attended that the meeting was highly successful.

M. I. GERSHENSON, *Program Chairman*

Institute of Mathematical Statistics (A3)

The 64th meeting (and the 17th annual meeting) of the Institute of Mathematical Statistics was held 27–30 Dec. In addition, a number of the sessions were held with the American Mathematical Society, the American Statistical Association, the Biometric Society, Western North American Region, and the Third Berkeley Symposium on Mathematical Statistics and Probability.

The sessions covered a wide variety of subjects from the purely theoretical (mathematical statistics and probability theory) to the applicational (astronomy, biology, fisheries, industrial research, physics, psychology, and public health). There were two special invited papers: Herman Chernoff, Stanford University, spoke on "Large sample theory in the parametric case," and Jerzy Neyman (University of California) spoke on "Probabilistic treatment of phenomena: stochastic models and interpolatory formulae." There were also three sessions of contributed papers.

EVELYN FIX, *Associate Secretary for the Western Region*

Pacific Coast Committee on Social Statistics of the Social Science Research Council (A4)

The Pacific Coast Committee on Social Statistics met in conjunction with the 121st meeting of the AAAS. The committee cosponsored four sessions, as follows: "Regional unemployment estimates," "Regional indexes of business activity," "Pacific Coast population trends," and "The social structure of cities." All these sessions were highly successful and well attended.

The committee held a business meeting on 28 Dec. and made plans for a conference in the spring of 1955 on the statistics of labor-management relations. A subcommittee was appointed to make plans for a conference on crime statistics, probably to be held in the spring of 1956.

M. I. GERSHENSON, *Chairman*

Third Berkeley Symposium on Mathematical Statistics and Probability (A5)

The first part of the *Third Berkeley Symposium on Mathematical Statistics and Probability*, emphasizing applications, was held 26–30 Dec. at the Statistical Laboratory. Reflecting the interests of the laboratory, the 11 sessions held were distributed among the following eight domains of statistical research: biology, one session (struggle for existence and genetics); astronomy, two sessions (spatial distribution of galaxies and HR diagram); problems of health, one session; statistical mechanics, one session; philosophy of science, one session (probability and induction); industrial research, one session; problems of psychology, one session; and mathematical statistics proper, two sessions.

It is hoped that, following the tradition established by the first two symposiums, held in 1945–46 and in 1950, respectively, the texts of the 31 papers presented will soon be published by the University of California Press in the *Proceedings of the Third Symposium*.

The second part of the Third Symposium, emphasizing theory, will be held in the summer of 1955. This is planned as a prolonged seminar extending through July and Au-

gust, and several participants are expected from abroad.

The Third Symposium is organized with the support of the Air Research and Development Command, of the National Science Foundation, of the Office of Naval Research, and of the Office of Ordnance Research. It was cosponsored by the AAAS and also, in whole or in part, by nine scientific societies: American Mathematical Society, American Physical Society, American Statistical Association, Astronomical Society of the Pacific, Biometric Society–Western North American Region, Ecological Society of America, Institute of Mathematical Statistics, Philosophy of Science Association, and Western Psychological Society.

J. NEYMAN, *Director, Statistical Laboratory*
University of California, Berkeley

Section on Physics (B)

At the Berkeley meeting Section B cosponsored the following symposiums and meetings: a session on statistical mechanics on 27 Dec. which was part of a symposium on *Mathematical Statistics and Probability*, a 3-day meeting of the American Physical Society 28–30 Dec., a 3-day meeting of the Meteorological Society on the same days; and two sessions of a symposium in biological and medical physics on 30 Dec. There was also a dinner arranged by the Physical Society and cosponsored by Section B on Thursday evening at the Men's Faculty Club. A. C. Helmholz (University of California) was toastmaster and Raymond T. Birge, chairman of the physics department (University of California) gave an interesting talk on "Science and pseudo science."

For most physicists the comprehensive program of the Physical Society was the major event of the meeting. There were 21 sessions, of these six sessions were invited papers and 15 sessions were largely contributed papers. Research and new developments in high-energy nuclear physics were featured in several sessions. The new bevatron at the Radiation Laboratory has recently been operated to give a 6.1×10^9-ev proton beam. In this energy range an interesting phenomenon is the production of K-mesons (965 times the electron mass) in addition to pions and muons. G. K. Green (Brookhaven Laboratory) described the plans for a 25×10^9-ev proton synchrotron, and construction of this will start soon.

This year the AAAS Newcomb Cleveland prize for an outstanding contribution to science was awarded to a physicist. The recipient was D. H. Alpert (Westinghouse Electric Corporation) for his paper on "Experiments at very low pressures." He has developed methods to produce and measure pressures as low as 10^{-12} mm of mercury.

The staff of the Physics Department and of the Radiation Laboratory were excellent hosts. For visiting physicists, the tours of the installations of the Radiation Laboratory were a most interesting feature. On Thursday evening the Radiation Laboratory group were hosts at a cocktail party for physicists at the Claremont Hotel.

At the council meeting Alan T. Waterman, director of the National Science Foundation was elected chairman of Section B and a vice president of the AAAS for 1955. The section committee elected Joyce A. Bearden, professor of physics at Johns Hopkins University, as a committee member for a 4-year term.

FRED L. MOHLER, *Secretary*

Section on Chemistry (C)

The meetings of the chemistry section, consisted of three sessions of submitted papers in various areas, two sessions of a symposium on petroleum chemistry, two sessions of a symposium on viruses and nucleic acids, and two sessions of a symposium on the harnessing of biological resources. Those who were fortunate enough to attend one or more of these informative and interesting meetings were well repaid for the effort and other sacrifices involved in attending this annual meeting of the AAAS. Sincere appreciation is expressed to the symposiums chairman and the various speakers who contributed to the production of these excellent sessions.

The 1955 annual meeting of the AAAS will be held in Atlanta, Georgia, during the holiday season. It is not too early to begin now to plan on presenting a paper before the chemistry section at this meeting. Abstracts and, if possible, copies of the completed paper should be sent to Ed. F. Degering, 26 Robinhood Rd., Natick, Mass., or to Roberts S. Ingols, chairman, Section C, Georgia Institute of Technology, Engineering Experiment Station, Atlanta, Ga., on or before 1 Sept. 1955.

ED. F. DEGERING, *Secretary*

American Chemical Society, California Section (C2)

The broad scope of petroleum chemistry was illustrated at the recent symposium held at the Berkeley meeting. The first paper dealt with the isolation and identification of sulfur compounds, a continuing basic problem of the industry. The next three papers described the novel and varied uses being made of radioisotopes as tracers in determining the course of reactions, the fate of components of fuels in engines, and in measuring flow rates in refinery equipment.

The concept that petroleum is a source of chemical raw materials, as well as a source of fuels and lubricants, was illustrated by the next four papers. The first two were concerned with aliphatic chemicals derived from acrolein, which, in turn, is made from propylene, a petroleum gas, and with silicate esters, which have novel properties, and may lead to many new applications. The derivation of aromatic acids, which are constituents of synthetic fibers and plastics, from petroleum by the oxidation of aromatic acids, and the chemistry of alkylation were the subjects of the last two papers in this group.

The last three papers dealt with recent developments in petroleum refining. The first described a new method of removal of mercaptans from gasoline, a necessary step in refining to remove objectionable odor. The next two described the use of hydrogen as a refining agent. They showed how hydrogenation could now be economically applied to many refinery fractions with resulting removal of impurities and general marked improvement in refining characteristics and properties.

JOHN W. GIVENS, *Program Chairman*

Section on Astronomy (D)

Section D and the Astronomical Society of the Pacific met jointly to present an elaborate and varied program. The Meteoritical Society held separate sessions—a result of the increasing activity in this field.

Three important symposiums were held. The first, arranged by the Astronomical Society of the Pacific, was on *The Nebular Red Shift*. Allan R. Sandage gave a fine summary of the observational data, and H. P. Robertson's paper on the theoretical aspects was read by L. G. Henyey. The second, arranged by the Statistical Laboratory, University of California, was concerned with *The Spatial Distribution of Galaxies*. Papers were presented by Fritz

Zwicky; by J. Neyman, Elizabeth L. Scott, and C. D. Shane; and by G. C. McVittie. There was a considerable amount of very lively discussion during and after this symposium. The third, also arranged by the statisticians, was on *The Hertzsprung-Russell Diagram*. Speakers were Bengt Stromgren, J. L. Greenstein, G. E. Kron, Harold Johnson, and Olin Eggen.

The contributed papers covered a wide range—from the classical field of astrometry to the new and rapidly developing field of radio astronomy. The latter field accounted for one-sixth of the program.

Highlights of the meeting were the special demonstration of the Morrison Planetarium on the evening of 27 Dec., and the trip to the Lick Observatory on 30 Dec.

The dinner at the Women's Faculty Club on 29 Dec. was an especially happy occasion. Seth B. Nicholson, the new chariman of Section D, was toastmaster. Speakers were Joel Stebbins and Harlow Shapley, the latter being a former president of the AAAS. Stebbins discussed "The decline of American astronomy since the introduction of the Ph.D. degree," and Shapley was equally serious during most of his remarks.

Following the dinner, a large audience listened to Bart J. Bok give his retiring vice-presidential address on "The new science of radio astronomy." This splendid survey of the field showed how rapid the advances have been. This is particularly noteworthy in the field of galactic structure, where the work has been done since the detection of the 21-cm hydrogen line in 1950. Bok and his students have been leaders in this field, and it was a privilege to hear such an authoritative and interesting presentation.

Nicholas U. Mayall, Joel Stebbins, and Otto Struve presided at the symposiums. Gerald M. Clemence, vice president and chairman of Section D, presided at all other sessions. Thanks are due to these gentlemen and to Louis G. Henyey and the other members of the local program committee for helping to make this meeting a memorable one.

FRANK K. EDMONDSON, *Secretary*

Meteoritical Society (D2)

The 17th meeting of the Meteoritical Society was held 27–30 Dec. with the AAAS in Berkeley. Twenty-one papers, broadly representative of the field of meteoritics, were presented in the course of four sessions. The papers could be classified loosely under the following three headings: (*i*) papers dealing with the recovery and preliminary description of newly found or newly fallen meteorites; in this group was a particularly significant paper on meteoritic material found at the Wolf Creek Crater in western Australia; (*ii*) papers dealing with the mineralogy and laboratory investigation of meteorites; (*iii*) papers dealing with the nature and motions of meteors, produced by meteorites in the earth's atmosphere.

Since this was an electoral meeting of the society, it terminated formally with the address of the retiring president, L. F. Brady (Museum of Northern Arizona). The following officers were elected for 4-year terms: president, D. M. Barringer (Barringer Crater Company, Philadelphia); vice presidents, Carl W. Beck (Indiana University); Dorrit Hoffleit (Harvard College Observatory); and Stuart H. Perry (Adrian, Mich.); secretary, John A. Russell (University of Southern California); treasurer, Paul W. Healy (University of New Mexico); editor, Frederick C. Leonard (University of California, Los Angeles); and director of the meteor section, Lincoln LaPaz (University of New Mexico).

The society shared invitations with the Astronomical Society of the Pacific to a special demonstration of the Morrison Planetarium in San Francisco and to the Lick Observatory on Mount Hamilton. In the course of the Morrison Planetarium demonstration, a fireball was flashed across the planetarium sky. The lecturer thereupon gave the meteoriticists present the extraordinary experience of seeing the same fireball in a repeat performance. Those making the trip to the Lick Observatory were the dinner guests of Director and Mrs. C. D. Shane. The highlight of the observatory tour was the inspection of the new 120-in. telescope and the shop in which the optical work on the mirrors for the instrument is being done.

The society banquet was held at Yamato's Sukiyaki House in San Francisco where, for nearly 2 hr, gastronomy was as close as any one came to the subject matter of Section D of the AAAS.

JOHN A. RUSSELL, *Secretary*

Section on Geology and Geography (E)

Section E presented sessions for general papers in both geology and geography, and a two-session symposium on air-borne devices and aerial photography entitled *Earth Science from the Air*. The contributed papers of the general sessions were of high caliber and in general were well illustrated. The number of papers presented and the good attendance at the two sessions on general geography reflect a greater interest by the geographers in the section than in the recent past, and consequently a better balance in the over-all program is being attained.

The symposium *Earth Science from the Air* was a current review of the use, and an evaluation of the potential, of aerial photography and air-borne instruments. The several aspects of this subject were discussed by the country's foremost workers in this relatively new but firmly established field of science. Two motion pictures, one in 3-D, added to the popular appeal of this program and a considerable portion of the audience represented the agriculture, engineering, and physics sections.

As in previous meetings, Section E presented the address by the retiring vice president at an evening smoker. M. F. Burrill, director of the division of geography, U.S. Department of the Interior, spoke on "Toponymic generics in the United States." In reporting on the progress of preparing a dictionary and atlas of generic terms of physical features in the United States, Burrill drew attention to the need for greater uniformity in the meaning of such terms and the desirability of their common use by both scientists and the lay public.

An added attraction of the section's Berkeley program was the geologic field trip arranged by the California Division of Mines. A geologic guidebook of the San Francisco Bay counties provided the basis for the tour of the Bay area. The Division of Mines also provided technical personnel to show members and guests of AAAS through its mineral exhibit.

JACK B. GRAHAM, *Secretary*

National Speleological Society (E7)

The program of the National Speleological Society, cosponsored by the American Nature Study Society, convened 28 Dec., with a welcome extended to the 45 members and guests present by Charles E. Mohr, presiding chariman.

To begin the session, Ruth E. Hopson presented a commentary "Lava tube caves" featuring a series of color

slides of the Lava Beds National Monument. Much work remains within the monument grounds on the identification of plants and animals, on the origin of lava tube cave features, and on plant and animal ecology. Information concerning many recent discoveries of "blind cave salamanders" was presented by James Kezer. With possible reflections on the causes of blindness, experiments reveal great differences in the amount of degeneracy of salamander eyes when the salamander's metamorphosis takes place in the presence or absence of light. Large periodic variations of salamander populations in underground locations were disclosed by Charles E. Mohr in his paper "Migration of cave animals." He also indicated the importance of some migration studies in public-health problems; for example, bats may become rabid and carry the disease hundreds of miles.

William R. Halliday's paper, "Glacial correlation of western caves," discussed tentative, theoretical considerations of cave growth in glacial periods and also in transitions from one glacial period to another. In support of these considerations, examples of an individual cavern's features and their possible connection with glacial periods were cited. Emphasizing the scientific importance of cave life, G. Nicholas stressed the "Biological aspects of cave conservation." While collecting of specimens is one factor in destroying cave life, he pointed out that many seemingly harmless alterations of environment can have drastic effects on animal and plant populations. An abstract of Ray DeSaussure's paper, "Solution of speleothems," which discusses factors affecting deposition and resolution of speleothems, was read by Mohr.

Chairman Mohr concluded the meeting with a discussion of National Speleological Society publication policy in relation to its effect on cave conservation.

HOWARD A. SHUGART, *Program Chairman*

Section on Zoological Sciences (F)

The program in the zoological sciences at the Berkeley meeting aroused much national, as well as local, interest and drew large audiences, even though relatively few of the national societies participated with complete programs. Its strength resulted from the large number of symposiums that cut across societal and even sectional boundaries. Most of these different symposiums were cosponsored by Section F and by strong West Coast societies or by the Western sections of the national organizations. The interest developed in these intergroup symposiums offers very real evidence of the wisdom of the Arden House memorandum of the AAAS.

The most extensive single program in the biological field (FG) was that of the Western Society of Naturalists. This covered sessions for contributed papers in all major areas, not only for its own members, but for all biologists from any part of the country. In addition, with the cosponsorship of Sections C, F, and G, it conducted a daylong symposium on *Photochemical Effects in Biological and Biochemical Systems* and with Sections F and G another on *The Cell*. These two well-planned symposiums of invited papers each drew audiences of more than 1000.

Another program that ran throughout the meeting and attracted much attention was the *International Conference on Animal Venoms* sponsored by Sections F and N. Speakers at this conference came from all over the United States and from many foreign countries.

The one national society exclusively in the zoological field that ran a full-scale program throughout the Berkeley meeting was the Society of Systematic Zoology. Its program began with a symposium on *Animal Courtship Patterns* and ended with the zoologists' dinner, with an address by H. W. Stunkard, president of the Society of Systematic Zoology and vice president of AAAS for Section F.

Two additional programs, which cut across several fields, aroused much interest among biologists. These were the *Third Berkeley Symposium on Mathematics and Statistics* (Section A5), and the program of the Donner Laboratory of Biophysics (Section N5).

All of these programs showed careful planning and coordination and were highly interesting to the visiting biologists. Their success demonstrates that the local zoological societies in any large area of the country can arrange programs of national interest, especially with cooperation from local research centers and national society officers. They demonstrate the growing interest in symposiums that cut across traditional subject borders.

It is hoped that arrangements for similar programs and symposiums may be arranged for the Atlanta meeting of AAAS in 1955. Interested groups are asked to communicate with the section secretary at an early date.

H. H. PLOUGH, *Secretary*

International Conference on Animal Venoms (F1)

The International Conference on Animal Venoms was held in Berkeley, California, December 27–30, 1954, as part of the 121st annual meeting of the American Association for Advancement of Science. More than 60 papers concerning the venoms of poisonous reptiles, arthropods and insects, a mammal, fishes and other marine organisms, including sea snakes, were contributed by experts from many parts of the world. Consideration was given to the zoological biochemical, and pharmacological, as well as the clinical, aspects of the problem of venoms and envenomation. The sessions were conducted on an informal but serious basis, and much good work on the dissociation of venoms and isolation of toxic components was reported.

Clinical features of importance brought out by the papers and subsequent discussions included: (i) Presence of a hyaluronidase-like substance in venoms, which causes rapid spread and absorption. (ii) Advisability of immediate application of a tourniquet if possible. (iii) Therapeutic ineffectiveness of incision and suction after insect and arthropod bites and stings, and, unless applied immediately, after reptile envenomation. (iv) Absence of action by ACTH and cortisone against reptile or spider venoms. (v) Recommendation of antihistamines to counteract sensitivity reactions. (vi) Heparin, used in treatment of envenomation with strongly coagulating venoms, afforded benefits that seemed to extend beyond its anticoagulating effects. (vii) Use of antivenom was universally approved for treatment of reptile and arthropod envenomation; the various serums available throughout the world for this purpose were listed. (viii) Development, refinement, and standardization of a new antivenom against the entire family Crotalidae were described. (ix) Addition of hyaluronidase to antivenom for subcutaneous injection apparently permits more rapid and efficient combination of venom and antivenom in the tissues. (x) Although some clinicians employ cooling of a snake-bitten extremity as a palliative and to slow absorption of the venom, the risks were emphasized, as exemplified in water exposure and immersion foot cases seen during the Korean War.

NANDOR PORGES and ELEANOR E. BUCKLEY, *Program Chairmen*

Cooper Ornithological Society (F2)

The Cooper Ornithological Society which now has a membership exceeding 1500, with representation in all 48 states as well as 29 foreign countries, had a very successful half-day program on the afternoon of 29 Dec. More than 100 members and guests attended. The following papers were presented: "Movements of adults and dispersal of juvenile salt marsh song sparrows" by Richard F. Johnston; "The avifauna of Drake's Bay shellmound" by Joan Malloy; "Andrew Jackson Grayson, bird painter of the western wilderness" by Lois C. Stone; "Effect of environmental changes on bird life in the San Francisco Bay region" by Junea W. Kelly; "Evolution of feeding adaptations in Darwin's finches (Geospizinae)" by Robert I. Bowman.

ROBERT T. ORR, *Program Chairman*

Society of Systematic Zoology (F6)

For its 7th annual meeting, the Society of Systematic Zoology was the guest of its Pacific Section, which arranged most of the program. On this first occasion for western zoologists to participate "at home," the program was carried largely by the section members.

Special features included a symposium, four public lectures, a behind-the-scenes tour of the California Academy of Sciences in San Francisco (including the Steinhart Aquarium and a special show in the Morrison Planetarium), an unusually attractive book lounge where refreshments were served, a film on the Galapagos Islands, and two well-attended dinners open to all zoologists.

The retiring president of the SSZ, Horace W. Stunkard, was also a vice president of the AAAS and chairman of Section F—Zoological Sciences. He gave his entertaining presidential address at the zoologists' dinner on the subject, "Freedom, bondage, and the welfare state," relating these concepts to animals of many groups and to their evolution, degeneration, and parasitism.

Officers for 1955 are president, L. M. Klauber; president elect, G. W. Wharton, Jr.; secretary-treasurer, R. E. Blackwelder. It was decided to hold the 1955 annual meeting with the AAAS at Atlanta, Ga.

RICHARD E. BLACKWELDER, *Secretary*

American Society of Limnology and Oceanography (FG1)

The four sessions for contributed papers included 21 on oceanographic and 13 on limnological subjects. In addition a symposium on *Recent Advances in Biological Oceanography* was arranged by R. W. Hiatt to review many aspects of this section of our fields. The meeting concluded in a joint session with the Western Society of Naturalists under the direction of Robert Bieri to discuss the *Distribution of Plankton of the North Pacific Ocean*. Concurrently with this meeting there was a visit to the River and Harbor Model Laboratory and the Algal Research Project at Richmond. The society was fortunate in having this visit arranged for them by the Department of Engineering of the University of California.

Among the many papers that aroused special interest, mention might be made of Joel Hedgpeth's provocative discussion of "The function of systematics in limnology and oceanography" and of Marie P. Fish's excellent and entertaining summary of our knowledge of "Sound production by marine animals" which she *illustrated* by sound film.

At the business meeting D. G. Frey was elected president and D. W. Pritchard vice president for the coming year, while consideration was given to the possibility of starting a journal for the publication of papers in the society's field.

G. L. PICKARD, *Secretary, Pacific Section*

Ecological Society of America (FG5)

The ecological program was arranged by the Western Section of ESA. The program included two sessions of contributed papers, two symposiums, joint sponsorship of the *Third Berkeley Symposium on Mathematical Statistics and Probability*, a field trip, and a dinner meeting. Attendance was good. Among the few officers of the society present from the East were the retiring president, J. E. Potzger, and the finance committee chairman, Paul B. Sears, now president elect of the AAAS.

The contributed papers were on such subjects as the use of predatory mites for effectively controlling eyelamen mite populations, methods for measuring rodent movements, and the ecology of deer and rodent populations.

The subjects of the two symposiums were *Marking Organisms in Ecological Studies* and *Dew as an Ecological Factor*. The symposium on marking of animals treated various methods of marking animals including tagging, fin clipping, toe clipping, tatooing, ear marking, and branding. The paper on the use of radioisotopes in marking organisms suggested an array of important problems and evoked wide interest. The danger of considering radioisotopes as universally useful in ecological research was emphasized. The symposium on dew dealt with the relationship of dew to agricultural crops, forest trees, reptiles, and game. The valuable discussion of the papers emphasized the importance of dew and the need for greater consideration of this ecological factor.

The field trip, attended by about 30 members and led by Herbert L. Mason, included Muir Woods and Mount Tamalpais where the effect of serpentine soils on vegetation was demonstrated.

One of the highlights of the ecological meeting was the Monday evening dinner address entitled "The nature and problems of the plant community" by Herbert L. Mason, professor of botany and director of the Herbarium in the University of California at Berkeley.

CURTIS L. NEWCOMBE, *Secretary, Western Section*

National Association of Biology Teachers (FG6)

The 17th annual meeting of the association consisted of three symposiums, a group discussion of biology laboratory problems, an all-day field trip, and a report on conservation education practices in use in the western states. The symposium, *Biology for Pleasure*, which ranged from recording the sounds of familiar animals to a study of unexpected life forms in the high Himalayas, stressed many ways by which the esthetic can be combined with the factual in teaching biology. *Biology for Living* presented the ecological approach as an effective means for teaching students to make proper use of living things. Two teachers demonstrated by means of slides and movies how effectively they are using the ecological approach in their high school teaching. *Biology for Survival* presented survival techniques used by various organisms, man included. A. Starker Leopold's ideas on predation excited much favorable comment.

At the annual luncheon of the association, William Weston's address on "Fungi as aids to the teacher" was

a most complete presentation of the ways teachers may use fungi to illustrate the major biological principles. Group discussions of laboratory problems in biology were followed by reports of each group to the entire audience. The tea on Tuesday afternoon, at the headquarters of the Audubon Society, gave opportunity for members to become better acquainted.

The joint field trip with the American Nature Study Society to Muir Woods and the chaparral near the Alpine Club Lodge on Mount Tamalpais was under the direction of Arthur Nelson and Thomas Howell. Friday morning was devoted to reports on special practices in conservation education that are in use in the western states. A report of the latest developments of the NABT Conservation Project by Richard L. Weaver terminated the meeting.

Officers for 1955 are H. Charles, president; Paul Webster, secretary-treasurer; John Harrold, president elect; Edna Higbee, first vice president; and Enid Larson, second vice president.

H. CHARLES, *President*

Society of General Physiologists (FG7)

A single session of 11 papers was held on 27 Dec., presided over by C. Stacey French. While this was essentially a western regional meeting of the society there were speakers as far east as Oak Ridge and New Orleans. Reflecting the fact that the society is interested in physiological phenomena common to all organisms, papers dealing with both plant and animal material appeared on the program. The society also cosponsored, with the Western Society of Naturalists and the Western Section of the American Society of Plant Physiologists, a symposium on *The Cell*, held the morning and afternoon of 29 Dec., with G. E. Palade, V. H. Cheldelin, R. Y. Stanier, R. C. Backus, Hans Ris, D. Mazia, D. I. Arnon, and J. J. Wolken as speakers and C. B. van Niel and M. Alfert presiding. A paper by K. R. Porter was read in his absence.

ALBERT TYLER, *Program Chairman*

Western Society of Naturalists (FG8)

For the Western Society of Naturalists, the Berkeley meetings provided an opportunity to extend to its annual winter meetings its long-established summer practice of joining with other constituent groups of the Pacific section of the AAAS in organizing special programs. The broad scope of the society, often reexamined and as often reaffirmed, provided a framework for variety and made it the natural host of members of biological groups not meeting with the AAAS this year. Seven half-day sessions of submitted papers included, with boundaries somewhat overlapping, two on physiology, two on natural history, and one each on vertebrate anatomy and physiology, on marine zoology, and on protozoology and parasitology. Arthur C. Giese, the retiring president, gave the annual address, "The rise of cellular physiology."

Special sessions included a symposium on *Natural Resources of the West* organized and led by R. C. Miller and two full-day panels, *The Cell* arranged by Daniel Mazia and R. Y. Stanier and *Photochemical Effects in Biological and Biochemical Systems* organized by A. D. McLaren. The largest single group of papers, those on *Science in the Arctic*, was planned jointly with the Arctic Institute of North America, whose representatives, M. J. Dunbar, chairman of the institute board, and I. L. Wiggins, a past president of the Western Society, led sessions and presented papers during the one evening and four half-day sessions. Reports came from most of the American institutions carrying on biological studies in the Arctic. One portion of this program, *Plankton Studies in the North Pacific* organized by Robert Bieri, was jointly sponsored by the American Society of Limnology and Oceanography.

The society voted to meet with the AIBS at Stanford University in Sept. 1957, dropping the December meeting that year, and to recommend that the Pacific Section, AAAS hold its 1957 meetings at the same time and place. The annual meeting for 1955 will be held at the University of California at Davis.

The society elected the following officers: president, Lyman Benson (Pomona College); vice president, Albert Tyler (California Institute of Technology); secretary, Demorest Davenport (Santa Barbara College, University of California); and member-at-large, Bradley Scheer (University of Oregon). Ivan Pratt (Oregon State College) continues as treasurer and L. R. Blinks (National Science Foundation) and A. W. Martin (University of Washington) as representatives on the AAAS Council.

J. L. MOHR, *Retiring Secretary*

American Phytopathological Society, Pacific Division (G1)

The program was composed entirely of symposiums and discussion sessions on phases of soil-inhabiting microorganisms and the control of diseases caused by plant pathogens of the soil. Attendance was far greater than expected. More than 200 crowded each session. Twice it was necessary to move to larger rooms to accommodate those interested.

These sessions emphasized that, while crop rotation is very beneficial, it alone is not a solution to the control of many soil borne plant diseases. The proper sequence of crops in rotation, however, shows much promise in disease control. Papers and discussion at these sessions pointed out the complexity of interaction of soil components, environment, cultural practices, and succession of crops. They demonstrated nevertheless that such were not beyond comprehension by illustrations of the successful analysis of some of them.

One of the highlights of the meeting was a talk by William H. Weston (Harvard University) at the banquet held jointly with the mycologists. Dr. Weston characterized advances of plant pathology during the past 32 years and pointed a way for the future.

H. H. McKinney, USDA, Beltsville, opened the discussion on soil-borne virus diseases as he reviewed many experiments with this group of cereal diseases. Other speakers at this session outlined evidence for soil retention of the rattle disease of tobacco and potatoes, big vein of lettuce, and the grape diseases, yellow mosaic and fanleaf. Among those contributing to the discussion on assay methods, J. W. Gerdemann (University of Illinois) illustrated techniques used for separating a spore stage of an apparent mycorrhiza from the soil and a method of testing pathogenicity of his isolates.

This program of symposiums and discussion on soil-borne plant-disease problems was very interesting and stimulating. Plant pathologists from several states attended the meetings and contributed to its success.

On behalf of the Pacific Division of the American Phytopathological Society, I wish to thank the many

who put so much effort into the well-organized and smooth-running Berkeley meetings of the AAAS.

WM. B. HEWITT, *Program Chairman*

Section on Anthropology (H)

The various sessions of Section H were well attended (about 60 to 130 persons at each) primarily, of course, by members from the west-coast states. Notable contributions to the two-session symposium *Culture Change in the Pacific Area* were made by the four participants from the 49th or 50th "state," Hawaii—Kenneth Emory, Samuel Elbert, Leonard Mason, and Alexander Spoehr. The last arranged the symposium and also delivered the public lecture of the Pacific Science Board "The human background of Pacific science," which, though not originally so scheduled, was in fact a major contribution to the section program.

The other symposium sponsored by Section H dealt with the contribution of studies of India and Pakistan to social science theory; David Mandelbaum planned this session. Section H also held two lively sessions of contributed papers and cosponsored the social science dinner, which was addressed by J. B. Condliffe.

G. W. LASKER, *Secretary*

Section on Psychology (I)

Three sessions of invited papers and three of submitted papers were arranged by Section I. In addition the section cosponsored six other sessions arranged by the Western Psychological Association, the Society for Research in Child Development, and the Third Berkeley Symposium on Mathematical Statistics. One group of invited papers dealt with the problem, *How Can Behavior Theory Best Handle the Construct of Motivation*; a second group had as a central theme, *The Nervous System and Behavior*; and a third considered *Psychological Factors in Highway Safety*. Section M—Engineering cosponsored the highway safety program.

The Western Psychological Association arranged symposiums on *Present Status of Psychoanalytic Theory*, *Sex Differences in Personality and Intellectual Development*, and *Perception: Learned and Unlearned*.

The vice-presidential address was given by Donald B. Lindsley. In his address, entitled "Crossroads of psychology and neurophysiology," Lindsley gave an excellent review of some of the recent neurophysiological research on the reticular formation and diffuse thalamocortical projection system and used examples from his own research to show how this kind of information from neurophysiology may be applied to psychological problems. Lindsley will be succeeded as vice president by S. S. Stevens.

Section I joined with Section K in sponsoring a social sciences dinner and the vice presidential address of Section K.

WILLIAM N. NEFF, *Secretary*

Section on Social and Economic Sciences (K)

The 1954 meeting was the best planned and best attended meeting in which Section K has participated in many years. The program had been developed by an interdisciplinary committee under the chairmanship of Harold E. Jones (University of California) and dealt primarily with problems of concern in the region.

A joint session with Section M was concerned with the appraisal of natural resources development, particularly in relation to benefit-cost analysis and the benefits that flow from engineering in natural resources development. Joint sessions with the American Statistical Association and the Pacific Coast Committee on Social Statistics of the Social Science Research Council were concerned with the social structure of cities and Pacific Coast population trends. A session was devoted to the organization of research for western regional development. At a dinner meeting sponsored jointly with Sections H, I, and Q, John B. Condliffe delivered the vice-presidential address on "International consequences of scientific research." Meetings were also held by the Committee for Social Physics, which devoted two sessions to a discussion of diffusion theory, and by the Society for the Advancement of Criminology, which devoted two sessions to discussion of various aspects of education in criminology. Jointly with the National Academy of Economics and Political Science and Pi Gamma Mu, a symposium was held on *National Defense against Atomic Attack*.

Conrad Taeuber was nominated as chairman of the section and Donald P. Ray was elected as secretary. Leonard S. Cottrell, Jr. was elected to a 4-year term on the section committee.

CONRAD TAEUBER, *Secretary*

Section on Engineering (M)

We feel that the Berkeley program held 27–30 Dec. was highly successful. There were 11 sessions cosponsored by Section M in which 39 papers were presented, of these the section contributed 17 papers. The attendance was excellent, varying from 56 to 240 at any one session, with an estimated total attendance of 1450. The attendance at each session justified our belief that engineers are interested in problems of general interest to society. Our participation was welcomed by the cosponsors, and each expressed a desire that we of Section M continue to participate in the discussion of these problems. The section expresses its thanks to Sections E, I, K, and O for their cooperation and to the Western Society of Soil Science, the American Geophysical Union, the American Society for Engineering Education, and the Engineering Manpower Commission for their cosponsored joint programs.

Our session on natural resources stimulated outstanding discussion from the floor and each paper was well received. Frank Baron's paper "Benefits from engineering in natural resources development" clearly indicates the role of an engineer in the development of our natural resources.

The symposium *Water Supplies and Irrigation* was of special interest to engineers, government workers, agriculturists, and the people of California. Water is a basic necessity to the economy of this state. Its control and utilization is vital to existence. The paper on "Water rights for agriculture" by W. A. Hutchins of the USDA clearly demonstrated the need for adequate legal control of water and its uses. Other papers presented at this session outlined the efforts for the reclamation of water and the steps that are being taken to relieve water shortage. Each of the speakers and discussants is to be commended for his honest approach to this basic problem.

The session on "Psychological factors in highway safety" indicated a need for further study on the problem of human behavior in an automotive age. We of engineering are equally concerned with this problem since it directly bears upon the technical problems of highway design. We note with interest the studies on driver attitudes that have been made by the psychologists.

Lauren B. Hitchcock, president of the Southern California Air Pollution Foundation, organized an outstanding symposium on *Air Pollution*. Each paper clearly defined the problem and contributed to its solution. This is a new and vital field in which the combined efforts of engineers, doctors, agriculturists, chemists, meteorologists, lawyers, and economists are needed for a solution.

The 1955 officers are Clarence E. Davies (American Society of Mechanical Engineers), chairman, and Frank D. Carvin (Illinois Institute of Technology), secretary. Members of the committee at large are E. L. Chandler (1955), E. F. Murphy (1956), C. F. Kayan (1957), and M. L. Towle (1958). Chairman of the general program committee is I. P. Orens (Newark College of Engineering); chairman of the Atlanta meeting program committee is Mario J. Goglia (Georgia Institute of Technology).

FRANK D. CARVIN, *Secretary*
CAMERON M. SMITH, *Secretary, Berkeley Program Committee*

Section on Medical Sciences (N)

This section consponsored several symposiums with other AAAS sections and participating societies. The main effort of the section, however, was the arrangement of a 2-day symposium on *Growth, Normal and Abnormal*. The program was arranged by Howard R. Bierman (City of Hope Medical Center, Duarte, Calif.). Paul Weiss, in a paper entitled "The nature of growth," outlined many of the basic problems confronting investigators in this field in addition to reporting some of the important new observations from his own laboratory, particularly those related to local tissue factors that modify the growth processes. Several papers were devoted to an evaluation of the effect of growth hormone on both normal and malignant growth.

A particularly significant paper was presented by Choh Hao Li on "The hypophyseal of growth hormone, its chemical nature and its action." Charles Huggins, in the vice-presidential address, discussed the effect on modifying the steroid molecule on growth of specific tissues, directing his attention primarily to steroids of estrogenic activity. Edwin E. Osgood presented a very interesting and important paper outlining a new technique of plotting the rate of growth on log-log paper. Straight-line relationships that are obtained make the analysis of data recorded in this way relatively simple. The discussions led by Wendell Stanley, Charles Huggins, Hans Lisser, and Frederick Crescitelli added much to the instructive and stimulating discussions at the end of each session.

ALLAN D. BASS, *Secretary*

American Psychiatric Association (N3)

On 30 Dec., the American Psychiatric Association cosponsored two meetings: "Panel on clinical applications of chlorpromazine and reserpine," in two parts, and "Panel on mechanism of drugs with behavioral effects" with Section N.

After the program had been announced, it became necessary to make a number of changes in speakers' names because of unavoidable absences. As finally revised, panel members for "Clinical applications of chlorpromazine" included Lester H. Margolis, Ames Fischer, Robert N. Butler, and Alexander Simon (University of California School of Medicine and the Langley-Porter Clinic, Department of Mental Hygiene, State of California); Anthony Sainz (Cherokee Mental Health Institute); and Vernon Kinross-Wright (Baylor University). Panel members for "Clinical applications of reserpine" included Nathan S. Kline (Rockland State Hospital); Leo E. Hollister, Leo Traub, and Wallace G. Beckman (Veterans Administration Hospital, Palo Alto); and A. E. Bennett (Merrick Memorial Hospital).

The morning panels arranged by Jacques S. Gottlieb (University of Miami, Florida) were presided over by Walter Freeman (formerly at George Washington University) in the absence of Gottlieb. Kline presided over the afternoon session.

The clinicians using either reserpine or chlorpromazine (or both) were all in agreement that these drugs represented a tremendous advance in the treatment of psychiatric patients. Caution was expressed against making exorbitant claims since the extent of clinical application is not yet fully known. Successes were reported in the treatment of outpatients with less need for referral to state hospitals. Within the state hospitals, both recently admitted and chronic patients, who were refractory to other types of therapy, responded to one or another of these drugs. The double blind studies and other control testing demonstrated beyond question the effectiveness of the medications in schizophrenia and in neurotics. There was, however, disagreement concerning the usefulness in affective disorders.

Both drugs were reported to produce Parkinsonism and convulsions in certain cases when used in large dosages. These were reversible upon reduction of the drug. Other side effects were considered minor. Dosage range and regime of treatment differed widely. Up to 4000 mg of chlorpromazine and 240 mgs of reserpine daily were reported but these were exceptional. Average range of chlorpromazine dosage was from 500 to 2500 mg. The average range of reserpine dosage was from 5 to 20 mg. The need for intramuscular preparations of the reserpine in psychotics was stressed.

It was urged that both of these drugs be considered as representative of central depressants rather than unique pharmaceuticals. It was suggested that both of them produced sedation, central nervous system depression, respiratory stimulation followed by depression, release of antidiuretic hormone, pseudocyesis and decrease of fertility, sympatholytic action in large doses, convulsions, and local anesthesia. It was stressed that both of these drugs (and others of the same type) have all of the afore-mentioned properties to a greater or lesser degree. The site of action of one property of the drug does not necessarily indicate that this is the same *locus operandi* of another property, that is, the drugs have multiple sites of action as well as multiple actions. Clarification of the pharmacology and relationship to other known drugs may suggest the development of many more related substances.

Chlorpromazine activates the abnormality in the epileptic encephalogram. In the schizophrenic or normal, the patient becomes clinically sleepy and no electroencephalographic changes other than sleep waves are noted. Chlorpromazine was found to antagonize mescaline physiologically and psychologically as evidenced by electroencephalogram, pulse, blood pressure, pupillary diameter, and subjective experience.

The psychotic state produced by lysergic acid diethylamide was felt to be not identical with that found in schizophrenia but there were sufficient similarities to suggest that a biochemical factor is involved in schizophrenia.

NATHAN S. KLINE, *Program Cochairman*

Society for Experimental Biology and Medicine, Southern California and Pacific Coast Sections (N7)

Our meeting was most successful. Upward of 100 people attended the sessions or contributed papers and the symposium on *Adrenal-Pituitary Relationships*. The morning session for contributed papers was presided over by Paul Starr (University of Southern California), and the afternoon symposium was presided over by Herbert Evans. Both sessions stimulated considerable interesting discussion.

ROBERT H. DREISBACH, *Secretary*

Section on Dentistry (Nd)

Section Nd held two sessions on 28 Dec. in Lewis Hall; 75 people were present. At the morning session Wendell L. Wylie presided. The general theme of the program was growth and development of the facial and oral tissues.

Rodney Mathews (University of California) discussed the factors involved in craniofacial morphology. He stressed the influence of heredity and illustrated his thesis by growth records of identical twins in which similar growth patterns were evident.

The effects of postnatal environment were discussed by Alton Moore (University of Washington). He stated that childhood malocclusion does not correct itself but, if not treated, persists in adult life. He showed the effects of thumb and tongue sucking, mouth breathing, and cleft palate. The deformities resulting from habits may severely affect tooth arrangement but do not affect growth centers of the face. He then discussed the probabilities of changing facial contours by orthodontic interference.

Robert Ricketts (Pacific Palisades) discussed the handling of postoperative cleft-palate cases and stressed the need for group study by orthodontists, prosthodontists, speech therapists, and mental hygiene experts, to effect an orderly rehabilitation program.

The last paper of the first session was given by J. C. Muhler (Indiana University) who presented data concerning the effectiveness of stannous fluoride as an anticariogenic agent. The data he presented indicated that it is a much more effective caries-prevention agent than sodium fluoride. His data were drawn from laboratory and animal experimentations and large numbers of children. No positive conclusions were drawn, but his splendid presentation clearly indicated that his investigations should be continued and checked by others.

The afternoon session was devoted to a symposium on *Radiation Hazards in the Dental Office*, with Gordon M. Fitzgerald presiding. A film prepared by the National Bureau of Standards and the American Dental Association was shown. R. L. Dobson (University of California Radiation Center) stressed the dangers of long-time exposure to small-intensity radiation. He reviewed the erythematous changes, burns, and blood dyscrasia, especially leukemia in x-ray handlers. He presented data indicating that the span of life may be shortened by continued low-grade exposure to radiation. William E. Nolan (University of California Radiation Center) described the hazards in 75 percent of dental offices he had surveyed. He stressed the need for the use of film badges, an aluminum filter in the tube, extended type of cone shield with small aperture, and lead screens that extend to the floor. He warned the operator against holding the film in the mouth of the patient with his finger or steadying the tube by holding it with the hand. Care should also be exercised to avoid radiation of people in adjacent rooms. He advised all dentists to have periodic surveys made of their x-ray equipment and its operation by experts.

Gordon Fitzgerald (University of California) illustrated safe practices of dental x-ray operation, stressing the value of the long cone and fast films that are safer and give better detail in the radiographs. The use of high voltage with a tube filter and a columnation of the beam was also recommended.

The section also cosponsored a symposium on preparation for medical and dental education in liberal arts colleges offered by Alpha Epsilon Delta Honor Society. Dentistry was represented by Willard C. Fleming (University of California).

Section Nd sent a resolution to the AAAS Council which reaffirmed its support of fluoridation of communal water supplies as a means of preventing dental caries. The council passed the resolution.

The seminar was summarized by B. V. A. Low Beer (University of California). This was a most informative and constructive seminar.

The following officers were elected: chairman and vice president, H. Trendley Dean; secretary, Russell W. Bunting; committee-at-large, Willard C. Fleming, 1955, Wendell L. Wylie, 1956, Thomas J. Hill, 1957, and James H. Shaw, 1958. Council representatives include H. Trendley Dean, S. Wah Leung, and George C. Paffenbarger; the chairman of local arrangements for the 1955 meeting will be J. F. Volker (University of Alabama).

R. W. BUNTING, *Secretary*

Section on Pharmacy (Np)

Section Np held four sessions on 28–29 Dec. at Berkeley. A total of 23 original research studies were reported and three panel discussions were held.

Two papers pertaining to nonnarcotic analgesics were of special interest. J. Hidalgo and Victor P. Seeberg (Cutter Laboratories) showed that salicylamide shares the antipyretic activity of salicylates and that it does not bind to serum proteins. Further, the brain level is reached rapidly as compared with aspirin where the same level was reached slowly. Salicylamide is excreted more rapidly than the salicylic compounds of the acetylsalicylic acid type. L. D. Edwards, T. S. Miya, and R. D. Gibson (Purdue University) described a biological method for the evaluation of nonnarcotic analgesics, using a stimulating apparatus simple in design and application that compares favorably with any procedure reported for laboratory animals. Utilizing their technique, the authors showed that salicylamide is more rapidly effective than acetylsalicylic acid and that it reaches a high level of activity more rapidly than do the salicylates.

Several papers reporting on radioactive isotopes as tools in research were presented. E. Ramstad and H. Lieberman (Purdue University) showed that the Krebs tricarboxylic acid cycle is nonoperative in *Bryophyllum calycinum*. Autoradiograms of the plant extract prepared by chromatography showed that the most highly labeled products formed from acetate with and without inhibitors was succinate rather than the citrate indicated in the Krebs cycle.

H. W. Youngken, Jr., and E. H. Djao (University of Washington) studied the uptake of acetate carboxyl carbon-14 by *Digitalis purpurea* from hydroponic culture and the incorporation of the acetate carboxyl carbon-14

by digitalis glycosides. Results indicate that the root tissues accumulate carbon in sufficient amounts in a 12-hr period, but that accumulation in the leaves in the same period is proportionately very low.

J. E. Christian, F. N. Andrews, L. D. Edwards, and P. C. Merker determined the residual hormone in the carcasses of estrogen-treated chickens and found that there was no significant difference in the estrogenic activity between the residues of the diethylstilbestrol-treated and control animals.

J. E. Christian, G. J. Sperandio, and P. W. Gerding (Purdue University) utilized labeled compounds to study the retention of an insect repellent in an emulsified base at the site of application and gave the results of an improved dimethyl phthalate formulation for prolonged activity.

Although panel discussions on ways and means of improving pharmacy service and the administrative responsibilities of the hospital pharmacist attracted considerable interest, the chief interest was in the panel discussion on hazardous domestic pesticides and household chemicals. Bernard E. Conley (American Medical Association) and A. C. Blackmann (California Division of Industrial Safety) brought out that drugs, pesticides, paint products, toys, art and hobby supplies, cleaning, polishing, and sanitizing agents, as well as plastics, solvents, fuels, and other materials are hazardous in normal use and about the home. A five-point program designed to encourage informative labeling and safe packaging, develop antidotes, standardize nomenclature, develop evaluating criterions, and sponsor an educational program were presented. T. C. Daniels (University of California) suggested that the distribution of potentially dangerous compounds must eventually be restricted to those who thoroughly understand the hazards involved and who are prepared to inform the public on how the hazardous compounds may be safely used. Leo R. Gardner (California Spraying Chemical Corporation) emphasized the educational programs being carried out by the Federal Government, our universities, farm extension services, National Safety Council, the Farm Bureau, county agents, and manufacturers. In particular, he emphasized the necessity of a proper disposal procedure for empty containers. In general, it was concluded that the tremendous values gained through the use of more than 3000 new hazardous chemical and other agents might be enhanced by proper controls and knowledge directed toward their safe use.

GLENN L. JENKINS, *Secretary*

Section on Agriculture (O)

Section O presented a program of four half-day symposiums at the Berkeley meetings: *Soil Management in Western Agriculture, Water Supplies and Irrigation, Seed Production in the Western States,* and *Problems in Horticultural Crops.* These four programs were arranged and presided over by Horace B. Cheney (Oregon State College) and F. J. Veihmeyer, Frank G. Parsons, and John H. MacGillivray (University of California, Davis), respectively. Space does not permit a review of all the excellent papers presented. A complete copy of the Section O program can be found in *Science* **120**, 911 (1954) and *Agron. J.* **46**, No. 11, 531 (1954).

H. E. Hayward (U.S. Salinity Laboratory, Riverside, Calif.) speaking on soil management remarked that there were 24 million acres of irrigated land in the 17 western states, and that the future calls for as much as 30 million acres. Estimates indicate that of the 8.5 million acres of land that probably can be irrigated, some degree of salinity affects 30 percent of this acreage.

The symposium on *Water Supplies and Irrigation* attracted a total of 175 persons. The growing demands for water and the supply available appeared to be the $64 question in California. A. D. Edmondston, state engineer of California, told where future sources of water could be located. From an environmental standpoint, the western states are ideally located for the production of seed crops of grasses, legumes, vegetables, and flowers. Frank G. Cuthbertson (Ferry-Morse Seed Company) reviewed the history and present trends of vegetable seed production in the western states. It was suggested that this paper might be published in installments in the *Seed World.* If this is done, it will furnish an excellent source of information for those interested. The fourth symposium covered five divisions of horticultural crops: namely, floriculture, breeding of vegetable crops, advances in viticulture, transportation of fruits and vegetables, and developments in subtropical agriculture. These five subjects, as well as those in the other symposiums, were very ably discussed. The average attendance at the four sessions was 90. Because of the type of programs, the audience was almost equally divided among research scientists, industry, and those with a general interest in agriculture.

F. D. KEIM, *Secretary*

Section on Education (Q)

The meetings of Section Q consisted of two sections for general papers, some symposiums, and several sessions in cooperation with other sections or affiliated societies. The American Educational Research Association helped develop two sessions, the International Council for Exceptional Children, two sessions, and the California Educational Research Association helped on one session. There were also joint sessions with the Society of Research in Child Development and Section I. Section Q also joined in the dinner meeting sponsored by Section K.

The caliber of papers was generally very high. Symposiums on reading and on the education of exceptional children were especially noteworthy. Mention should also be made of the symposium developed by the AAAS Cooperative Committee on the Teaching of Science and Mathematics at which excellent papers were presented.

There appears to be a definite place for a few sessions of general papers, but the joint sessions with other sections and the affiliated societies seem to be becoming highly desirable features of these meetings.

DEAN A. WORCESTER, *Secretary*

National Science Teachers Association (Q5)

As a part of the recent AAAS meetings in Berkeley, the National Science Teachers Association conducted its Winter Regional Conference, 27, 28, and 29 Dec. This was one of a pattern of three regional conferences and one national convention held by NSTA during 1954.

The Western Region in whose interests this conference was carried out includes the seven western states plus Hawaii and Alaska. Actually, conference participants came from all parts of the nation—not a few from the eastern seaboard. Registration and attendance records show names of more than 700 people participating. On this basis, it is conservative to estimate an actual conference attendance of at least 800, while the actual num-

ber of different persons involved might be closer to 1000! This is by all odds the largest regional conference ever conducted by NSTA.

Keynote speakers during the 3-day session were William G. Sweeney (San Jose State College), who addressed a general session on "The schools their problems, and you," and John S. Richardson (Ohio State University), who spoke to all conference delegates on "Science teachers face their problems." Each of these major addresses was followed by a series of planned discussion groups. One entire morning general session was devoted to surveys of recent research in science education and analyses of the significance of this research to science teachers. This research session was jointly sponsored by the National Science Teachers Association, the National Association for Research in Science Teaching, AAAS Section Q (Education), the AAAS Cooperative Committee on the Teaching of Science and Mathematics, and the Western Society of Naturalists.

Other highlights of the conference included a social mixer arranged by the Elementary School Science Association of northern California, and featuring selected portions from the General Electric "House of Magic." Well over 300 people attended a luncheon program at which NSTA president Walter S. Lapp presided over a "This is your NSTA" program. During the last general session, the association honored Edna W. Bailey, professor of education emeritus (University of California), one of the West Coast's very early pioneers in science education. Closing events of the busy 3-day schedule were "Try-it-yourself" science exhibits and the ever-popular "Here's-how-I-do-it" demonstrations of classroom procedures in science teaching.

General chairman for the NSTA Western Regional Conference was Robert Stellberg (San Francisco State College), and president elect of NSTA. He was ably assisted by 69 members of local committees and received helpful advice from scores of others throughout the nation, particularly in the West. A total of 152 different persons participated directly in the presentation of various parts of the conference program.

ROBERT STOLLBERG, *Program Chairman*

Conference on Scientific Editorial Problems (X6)

The third annual Conference on Scientific Editorial Problems consisted of four sessions. The first session on 29 Dec., was concerned with manuals for complex instruments and was presided over by Leslie E. Neville. Speakers included Henry E. Marschalk (Publications Branch, Bureau of Ordnance, Department of the Navy), "Technical manuals—their increasing importance to industry and defense"; Charles A. Scarlott (Technical Information Services, Stanford Research Institute), "The technical manual and its readers"; and J. George Adashko (Ford Instrument Company), "Editorial and graphic techniques in preparing the technical manual."

The second session considered the problem of effective technical writing and was presided over by Milton O. Lee. Speakers were John Foster, Jr. (Columbia University), "Effective technical writing"; Kenneth A. Townley (Bureau of Mineral Resources, Department of National Development, Commonwealth of Australia) paper read by Graham Unikel (Stanford University), "Clarity in geological writing"; D. T. McAllister (Technical Information Department, U.S. Naval Ordnance Test Station, China Lake, Calif.), "Is there accepted scientific jargon?" and Alton L. Blakeslee (Associated Press), "Better communication between scientists and the public."

The third session was devoted to scientific journals and was presided over by the chairman of the conference. Speakers included J. Murry Luck (*Annual Reviews of Biochemistry* and *Annual Reviews, Inc.*), "Reviews"; William C. Steere, (Biological and Medical Sciences Division of the National Science Foundation), "Some problems of professional botanical journals"; Robert C. Miller (California Academy of Sciences), "Care and Training of authors"; and Howard A. Meyerhoff (Scientific Manpower Commission), "Useless publication."

The final session held 30 Dec., considered military and industrial technical reports and was presided over by A. E. Tyler. This session was cosponsored by the Technical Publishing Society. Speakers were Charles De Vore (Naval Research Laboratory), "Technical information—communication for research"; Nash Candelaria (Nuclear Engineering and Manufacturing Department, North American Aviation, Inc.), "Security and the editor"; Brownlee Haydon (The Rand Corporation), "Communicating research results"; and Donald H. Hale (Research and Engineering Command, U.S. Army Chemical Corps), "The technical report—its use in military planning." A message from Donald A. Quarles, Assistant Secretary of Defense for Research and Development, was read to the conference by Hale.

Plans are being made for the fourth Conference on Scientific Editorial Problems to be held in conjunction with the 1955 AAAS meeting in Atlanta.

MARIAN FINEMAN, *Chairman*

Scientific Manpower Commission (X13)

The fourth annual conference on scientific manpower devoted its two half-day sessions to consideration of certain aspects of training and utilization of scientific and technical personnel.

The first session on 28 Dec. concerned itself with the general theme *Implications of the Findings of the Commission on Human Resources and Advanced Training.* Lee A. DuBridge (California Institute of Technology), discussed the report from the standpoint of the natural sciences and noted the sizable, although by no means unlimited, potential of human talent that could be utilized with proper training to meet specialized personnel needs. Conrad Taeuber, (Bureau of the Census) spoke on social science implications and stressed the social scientist's interest in the factors underlying the youth's decision of whether to take advanced training. Ralph W. Tyler (Center for Advanced Study in the Behavioral Sciences) discussed science teaching with particular note of the need to bridge the gap between college and high-school instructional levels. Discussants for the program included Marsh White (Pennsylvania State), Donald W. Taylor (Stanford University), and John R. Mayor (University of Wisconsin).

On 29 Dec. a session was devoted to *Prospective Developments in the Utilization of Scientists and Engineers.* Raymond H. Ewell (National Science Foundation) reported on the level of Federal Government expenditures for research and development and noted that a level of about $1.8 billion was reached in 1953 with some decline since. A. L. Lyman (California Research Corporation) estimated industrial research expenditures at a 1955 level of $1850 million which represents about a 16-percent increase from 1953. Jesse E. Hobson (Stanford Research

Institute) opened the discussion on these papers and questioned whether larger government appropriations are the most desirable method of encouraging basic research. Methods of encouraging greater direct expenditures from industry may be more effective.

Ralph Chaney (University of California) read Congressman Hinshaw's paper on new military manpower legislation. This paper pointed out that the United States has few advantages over the Soviet Union in any test of strength. A principal source of our strength lies in our people and their abilities to originate and develop new ideas or things. It becomes particularly important to utilize these talents in ways that will contribute to maximum strength. It is proposed that a special manpower council be established as the agency responsible for the decision whether an individual with scientific or technical competence shall serve in a military or in a civilian capacity.

Papers are now being collected for publication by the National Science Foundation. A limited number of copies will be available for distribution by that agency.

THOMAS J. MILLS, *Program Director*

Scientific Research Society of America (X14)

The sixth annual convention of the Scientific Research Society of America was held at Berkeley, on 30 Dec. in conjunction with the annual meeting of the AAAS. A total membership of about 4000 in 31 branches and clubs and the membership-at-large group was reported. H. M. O'Bryan (Sylvania Electric Products) was elected to complete the term of the late Karl T. Compton as a member of the board of governors, and O'Bryan, C. G. Suits (General Electric Company), and C. N. Kimball (Midwest Research Institute) were elected to the board for 3-year terms beginning 1 July 1955. Officers of RESA are J. W. Barker, chairman, who will be succeeded by Wallace R. Brode on 1 July, and Donald B. Prentice, director and treasurer.

The annual RESA address was given before an audience of more than 1000 by Vannevar Bush, president of the Carnegie Institution of Washington. Bush also received the William Procter prize for scientific achievement.

DONALD B. PRENTICE, *Director*

I value in a scientific mind, most of all, that love of truth, that care in its pursuit, and that humility of mind which makes the possibility of error always present more than any other quality. This is the mind which has built up modern science to its present perfection, which has laid one stone upon the other with such care that it today offers to the world the most complete monument to human reason. This is the mind which is destined to govern the world in the future, and to solve the problems pertaining to politics and humanity as well as to inanimate nature. It is the only mind which appreciates the imperfections of the human reason, and is thus careful to guard against them. It is the only mind that values truth as it should be valued and ignores all personal feeling in its pursuit.—H. A. ROWLAND.

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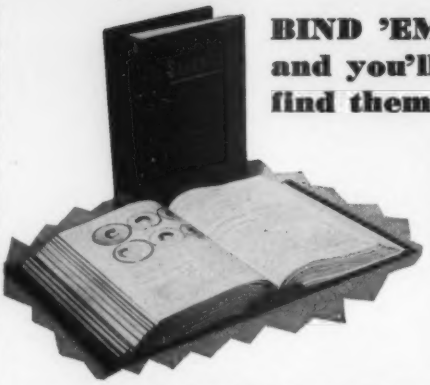

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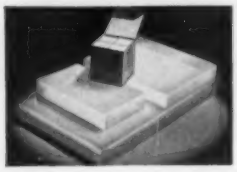

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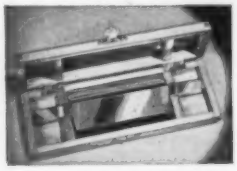

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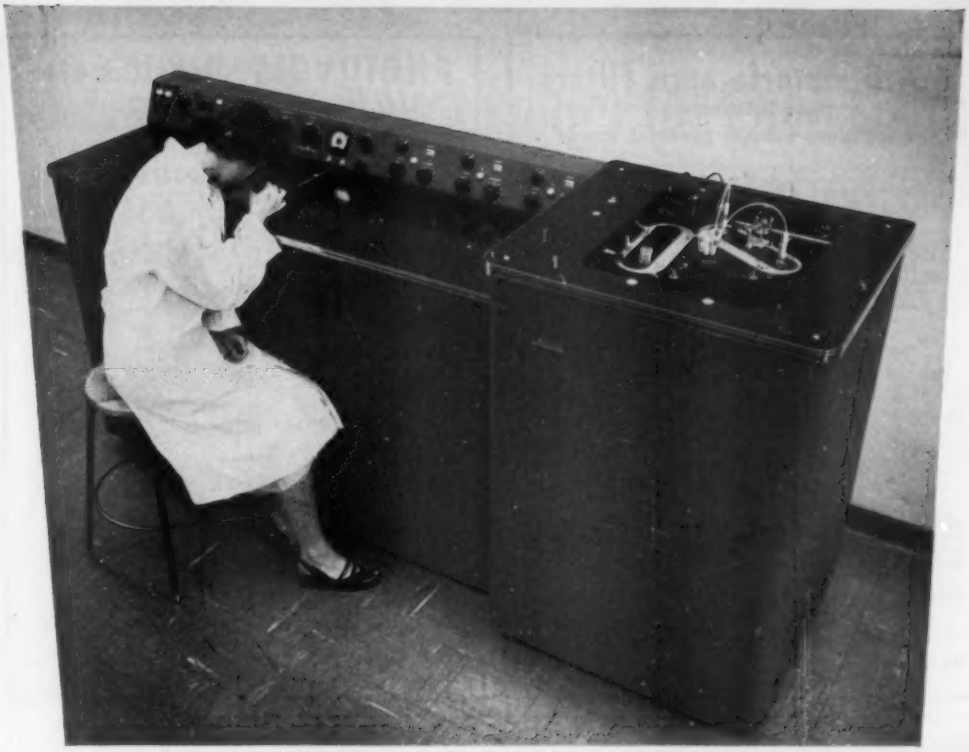

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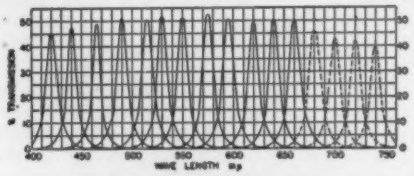

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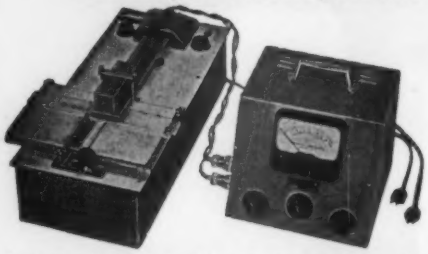

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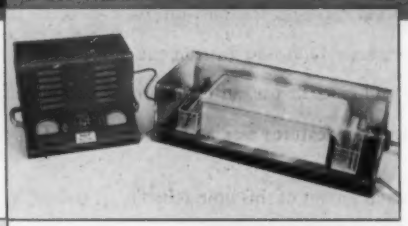

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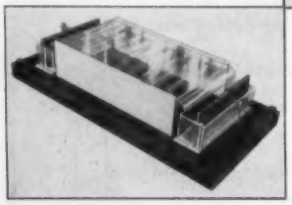

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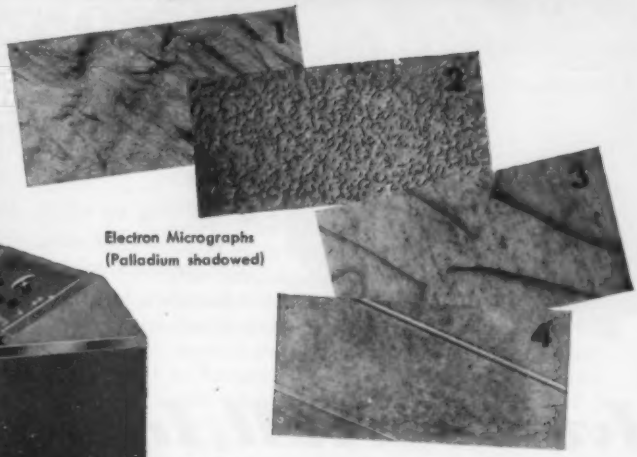
Mr. J. J. Kelch, Physicist at the Interchemical Corp. Research Laboratories, New York, operating the new RCA EMU-3A Electron Microscope.



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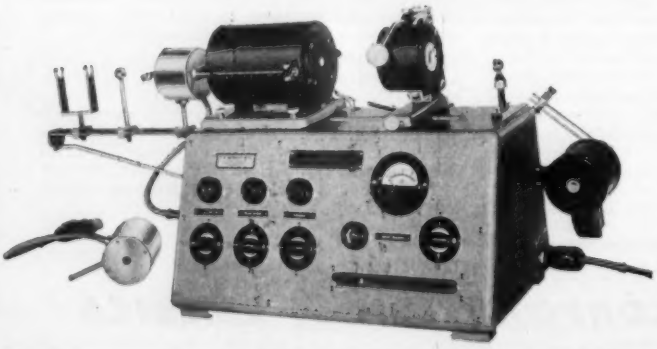

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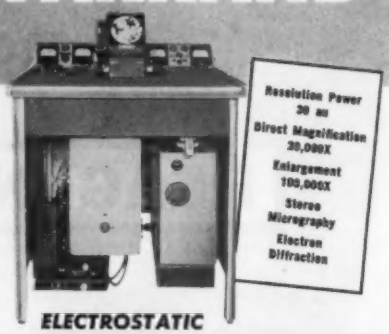

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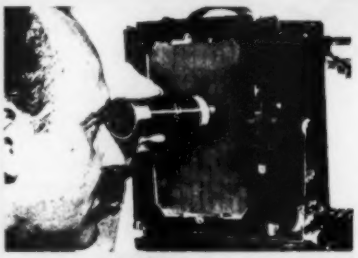

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Vol. 121

Rededication to Liberal Decency

THERE is at present a sickness in our country—a sickness of rumor and anxiety, of suspicion and distrust, and, at its worst, of fear and tragedy. In part, this sickness is the result of overemphasis on caution for the past rather than on constructive courage with respect to the future. In part, it is an anti-intellectualism, a strange and dangerous lack of faith in scholarly competence. In part, it is, we all realize, the misguided groping of sincere persons who really want to be good citizens but who have been misled as to what good citizenship is. In its worst part it is the horrid result of political pressure, of personal selfishness, and of the pathological arrogance of demagogs with small and nasty minds.

One of the most dangerous and wicked results of this disease is the destruction of confidence—confidence that honest, capable, and devoted service will be rewarded as such; confidence that governmental promises can be trusted to be stable, confidence that the precious Anglo-Saxon tradition of due process will be observed.

This sickness attacks our society at all levels and in all fields of activity. Science is in a position to be particularly aware of the dangers in this sickness, but science asks for no special privilege or protection. Science voices its concern but primarily because the problem is a universal one.

Many of the dread disorders of men's bodies involve the production of antibodies which furnish future immunity from the disease. But a most irrational and discouraging fact about our society's present disease is that apparently one can never stop worrying, can never be sure that the disease will not strike again and again and again.

Some of us—partly only because of the accidental character of our activities, partly because we attest to our liberalism in more discreet (or should I say more timid) ways—have so far avoided this disease. But no one of us is immune.

The time has been reached, many of us are convinced, when it is no longer defensible to fail to take a stand. We must use all our wits and patience, all our reasonableness and courage, to see to it that we take a really sensible, constructive stand, and in particular that we do not fight fire with fire. Although there often is much incentive to protest without restraint, we must not do this. Freedom is too precious to deserve rash or stupid support.

There is some encouraging evidence that this past year may have seen the worst of this disease. There are promising signs that at appropriately high levels in our government a concern now exists to improve the whole loyalty-security-secrecy setup. If this is in fact done with promptness and candor, then we can hope that the disease will also begin to wane in other places and in other fields of interest.

So there is a chance that, at this particular session of the AAAS, we are actually celebrating the upturn, the overdue rededication to liberal decency. If so, then there is a poetic appropriateness to this occasion. It is my very great pleasure, and my special honor, to present to you Edward Uhler Condon, the retiring president.

WARREN WEAVER, *President*
American Association for the Advancement of Science

This article is an excerpt from Dr. Weaver's introductory remarks to the address of the retiring president at the annual meeting of the AAAS in Berkeley, California, 28 December 1954.

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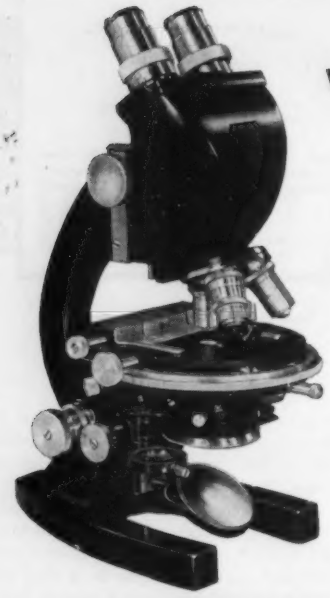

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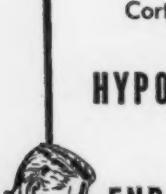

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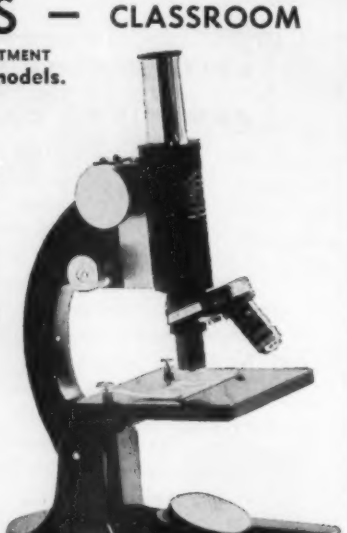

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21–23. Aero Medical Assoc., 26th annual, Washington, D.C. (R. J. Benford, P. O. Box 1607, Washington 13.)

23–26. International Academy of Proctology, 7th annual, New York. (IAP, 43–55 Kissena Blvd., Flushing, N.Y.)

24–26. National Science Teachers Assoc., Cincinnati, Ohio. (R. H. Carleton, 1201 16 St., NW, Washington, D.C.)

25–26. Michigan Acad. of Science, Arts and Letters, E. Lansing, Mich. (George M. McEwen, Univ. of Mich., Ann Arbor.)

28–31. American Assoc. of Petroleum Geologists, New York, N.Y. (E. H. Powers, Box 670, Fort Worth, Tex.)

28–1. Western Metal Exposition, 9th, Los Angeles, Calif. (W. H. Eisenman, 7301 Euclid Ave., Cleveland 3, Ohio.)

29–7. American Chemical Soc., 127th national, Cincinnati, Ohio (A. H. Emery, 1155 16 St., NW, Washington 6, D.C.)

31–2. Soc. of Research in Child Development Monticello, Ill. (C. B. Stendler, College of Education, Univ. of Illinois, Urbana.)

April

1–5. Japan Medical Cong., Kyoto. (M. Goto, Univ. Hospital, Kyoto Univ., Kyoto.)

2. Kappa Delta Pi, Cleveland, Ohio. (E. I. F. Williams, 238 E. Perry St., Tiffin, Ohio.)

3–6. American Astronomical Soc., Princeton, N.J. (C. M. Huffer, Washburn Observatory, Madison 6, Wis.)

3–7. American Colleges Personnel Assoc., Chicago, Ill. (C. Evans, Univ. of Indiana, Bloomington.)

4. American Educational Research Assoc., Cleveland, Ohio. (F. W. Hubbard, 1201 16 St., NW, Washington, 6, D.C.)

4–5. Atomic Industry Conf., San Francisco, Calif. (Atomic Industrial Forum, 260 Madison Ave., New York, N.Y.; or Stanford Research Inst., Stanford, Calif.)

4–5. Histochemical Soc. Symposium, Philadelphia, Pa. (A. B. Novikoff, Waldemar Medical Research Foundation, Port Washington, N.Y.)

4–5. National Gastrointestinal Cancer Conf., sixth, New York, N.Y. (Morris K. Barrett, National Institutes of Health, Bethesda 14, Md.)

4–6. American Assoc. of Physical Anthropologists, Philadelphia, Pa. (J. L. Angel, Jefferson Medical College, 307 S. 11 St., Philadelphia 7.)

4–6. International Meeting on Phlebology, 3rd, Aix-en-Provence, France. (F. Beurier, 4 Cours Mirabeau, Aix-en-Provence.)

5. Microcirculatory Conf. for Physiology and Pathology, 2nd, sponsored by American Association of Anatomists, Philadelphia, Pa. (G. P. Fulton, College of Liberal Arts, Boston Univ., 725 Commonwealth Ave., Boston 15.)

5. Tissue Culture Assoc., annual Philadelphia, Pa. (M. R. Murray, TCA, College of Physicians and Surgeons, New York 32, N.Y.)

5–7. French Medical Cong. on Thrombosis and New Antibiotics, 30th, Algiers, Algeria. (R. Raynaud, 12 Rue A.-Leluch, Algiers.)

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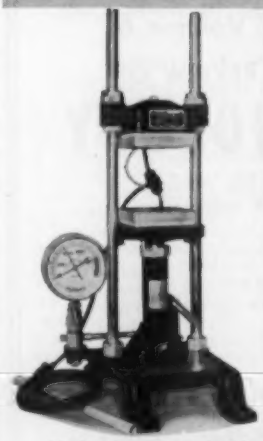

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6–8. American Assoc. of Anatomists, Philadelphia, Pa. (N. L. Hoerr, 2109 Adelbert Rd., Cleveland 6, Ohio.)

8–9. Pennsylvania Academy of Science, Philadelphia, Pa. (K. Dearolf, Public Museum and Art Gallery, Reading.)

9. South Carolina Acad. of Science, Columbia, S.C. (H. W. Freeman, Univ. of South Carolina, Columbia.)

10–15. American Inst. of Homeopathy, Washington, D.C. (W. R. Huntsman, AIH, 1601 Chestnut St., Philadelphia 3, Pa.)

10–15. American Inst. of Nutrition, San Francisco, Calif. (R. W. Engel, Dept. of Biochemistry and Nutrition, Virginia Polytechnic Inst., Blacksburg.)

10–15. Federation of American Societies for Experimental Biology, San Francisco, Calif. (M. O. Lee, 2101 Constitution Ave., Washington 25, D.C.)

10–16. American Physiological Soc., San Francisco, Calif. (M. O. Lee, 2101 Constitution Ave., Washington 25.)

10–16. American Soc. for Experimental Pathology, San Francisco, Calif. (C. C. Erickson, Inst. of Pathology, Univ. of Tennessee, 858 Madison Ave., Memphis.)

10–18. International Soc. of Urology, Athens, Greece. (Z. Kairis, 25 Voucourestiou St., Athens.)

11–14. Assoc. of American Geographers, annual, Memphis, Tenn. (B. W. Adkinson, Library of Congress, Washington 25, D.C.)

11–14. International Poplar Commission, 8th session, Madrid, Spain. (Secretary, c/o Forestry Div., FAO, Villa Borghese, Rome, Italy.)

11–15. American Assoc. of Immunologists, annual, San Francisco, Calif. (F. S. Cheever, Graduate School of Public Health, Univ. of Pittsburgh, Pittsburgh 13.)

11–15. American Soc. of Biological Chemists, San Francisco, Calif. (P. Handler, Duke Univ. School of Medicine, Durham, N.C.)

12–15. International Union of Biological Sciences, 12th general assembly, Rome, Italy. (P. Weiss, 2101 Constitution Ave., Washington 25, D.C.)

13–15. Conf. on Biological Waste Treatment, New York, N.Y. (W. W. Eckenfelder, Civil Engineering Dept., Manhattan College, New York 71.)

13–16. Mathematical Assoc., conference, Leicester, England. (F. W. Kellaway, 87 Pixmore Way, Letchworth, Herts.)

14. World Meteorological Organization, 2nd cong., Geneva, Switzerland. (G. Swoboda, WMO, 1, Ave. de la Paix, Geneva.)

14–15. High Polymer Forum, 6th Canadian, cosponsored by Chemical Inst. of Canada, National Research Council of Canada and Polymer Corp., Inc., St. Catherines, Ontario, Canada. (D. G. Ivey, Dept. of Physics, Univ. of Toronto, Toronto.)

14–16. National Speleological Soc., Natural Bridge, Va. (E. Moffett, 3047 S. Columbus St., Arlington, Va.)

15–16. American Mathematical Soc., Brooklyn, N.Y. (AMS, 80 Waterman St., Providence 6, R.I.)

15–16. Eastern Psychological Assoc., Philadelphia, Pa. (G. Lane, Dept. of Psychology, Univ. of Delaware, Newark.)

Meetings & Conferences

April, *contd.*

15–16. Iowa Acad. of Science, Davenport, (J. L. Laffoon, Iowa State College, Ames.)

15–16. Louisiana Acad. of Sciences, joint meeting with New Orleans Acad. of Science, New Orleans. (E. S. Hathaway, 1423 Jefferson Ave., New Orleans 15.)

15–16. Montana Acad. of Sciences, Butte. (L. H. Harvey, Dept. of Botany, Montana State Univ., Missoula.)

15–17. Italian Soc. of Geophysics and Meteorology, 3rd general assembly, Genoa. (I. Dagnino, 5 Via Balbi, Genoa.)

16. Committee for the Scientific Study of Religion, spring, New York, N.Y. (W. H. Clark, Hartford Seminary Foundation, Hartford 5, Conn.)

17–20. American Oil Chemists' Soc., 46th annual, New Orleans, La. (C. L. Hoffpauir, 2100 Robert E. Lee Blvd., New Orleans 19.)

17–21. American Dermatological Assoc., Belleair, Fla. (ADA, 102 E. 78 St., New York, N.Y.)

18–19. National Air Pollution Symposium, 3rd, Pasadena, Calif. (A. M. Zarem, 621 S. Hope St., Los Angeles 17, Calif.)

18–20. National Association for Research in Science Teaching, New York, N.Y. (W. C. Van Deventer, Dept. of Biology, Western Michigan College of Education, Kalamazoo.)

21–22. Eastern States Health Education Conf., New York Academy of Medicine, New York, N.Y. (NYAM, 2 E. 103 St., New York 29.)

21–23. Assoc. of Southeastern Biologists, annual, Charleston, S.C. (M. E. Gaulden, Biology Div., Oak Ridge National Laboratory, Oak Ridge, Tenn.)

21–23. Ohio Academy of Science, annual, Ohio Wesleyan Univ., Delaware. (R. W. Dexter, Kent State Univ., Kent, O.)

22. American Eugenics Soc., annual New York, N.Y. (AES, 230 Park Ave., New York 17.)

22–23. American Mathematical Soc., Chicago, Ill. (E. G. Begle, Dept. of Mathematics, Yale Univ., New Haven 11, Conn.)

22–23. Arkansas Acad. of Science, annual, Searcy. (L. F. Bailey, Univ. of Arkansas, Fayetteville.)

22–23. Georgia Acad. of Science, Athens. (W. B. Redmond, Box 534, Emory University, Ga.)

24–26. American Association for the Advancement of Science, southwestern division, Sante Fe, N.M. (F. E. E. Germann, Dept. of Chemistry, Univ. of Colorado, Boulder.)

24–29. Inter-American Cong. of Radiology, Washington, D.C. (E. P. Pendergrass, 3400 Spruce St., Philadelphia 4, Pa.)

25–27. National Acad. of Sciences, 92nd annual, Washington, D.C. (Secretary, NAC, 2101 Constitution Ave., NW, Washington.)

25–30. International Symposium on Electrical Discharges in Gases, Delft, Netherlands. (A. W. van Wagensveld, Mijnbouwplein 11, Delft.)

26–28. American Industrial Hygiene Assoc., Buffalo, N.Y. (H. F. Smyth, Jr., 4400 5 Ave., Pittsburgh 13, Pa.)

26–29. International Health Cong., Bournemouth, England. (P. A. Wells, 90 Buckingham Palace Rd., London, S.W.1.)

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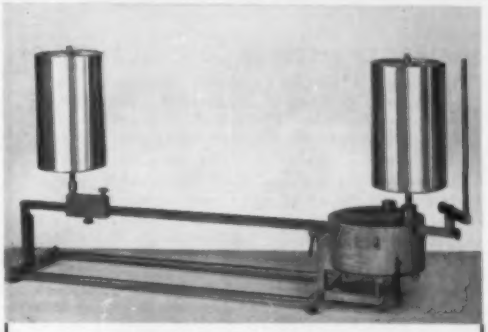

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April, *contd.*

26–1. International Symposium on Arid Land Problems, Albuquerque, N.M. *2–4* May. Conference (by invitation only), Socorro, N.M. (J. A. Behnke, 1515 Massachusetts Ave., NW, Washington 5, D.C.)

27–29. International Conference on Nuclear Engineering, Los Angeles, Calif. (T. J. Connolly, Dept. of Engineering, Univ. of California, Los Angeles 24.)

27–29. Soc. for Experimental Stress Analysis, Los Angeles, Calif. (W. M. Murray, Central Square Station, P.O. Box 168, Cambridge 39, Mass.)

28. West Virginia Academy of Science, Fairmont, W.Va. (James T. Handlan, Jr., Potomac State College, Keyser, W.Va.)

28–30. American Physical Soc. Washington, D.C. (K. K. Darrow, Columbia Univ., New York 27.)

28–30. Midwestern Psychological Assoc., Chicago, Ill. (L. J. Cronbach, 1007 S. Wright, Champaign, Ill.)

29–30. Alabama Acad. of Science, Tuscaloosa. (H. McCullough, Howard College, Birmingham, Ala.)

29–30. Colorado-Wyoming Acad. of Science, Greeley, Colo. (O. W. Olsen, Colorado A. & M. College, Fort Collins.)

29–30. Mississippi Acad. of Sciences, Meridian. (C. Q. Sheely, Box 574, State College, Miss.)

29–30 Seismological Soc. of America, Berkeley, Calif. (G. D. Louderback, Bacon Hall, Univ. of California, Berkeley 4.)

30. American Mathematical Soc., Stanford University, Calif. (E. G. Begle, Dept. of Mathematics, Yale Univ., New Haven 11, Conn.)

30. New Hampshire Acad. of Science, Hanover, N.H. (H. W. Curtis, Thayer School, Dept. of Elec. Engineering, Dartmouth College, Hanover.)

30–3. American College of Apothecaries, Inc., Miami Beach, Fla. (R. E. Abrams, 2173 Knorr St., Philadelphia, Pa.)

May

1–3. American Assoc. of Colleges of Pharmacy, Miami, Fla. (R. A. Deno, College of Pharmacy, Univ. of Michigan, Ann Arbor.)

1–3. American Soc. of Hospital Pharmacists, Miami Beach, Fla. (G. Neimeyer, 2215 Constitution Ave., NW, Washington, D.C.)

1–4. American Institute of Chemical Engineers, Houston, Texas. (S. L. Tyler, AICE, 120 E. 41 St., New York 17.)

2–4. American Geophysical Union, annual, Washington, D.C. (W. E. Smith, AGU, 1530 P St., NW, Washington 5.)

2–5. Electrochemical Soc., Cincinnati, Ohio. (H. B. Linford, 216 W. 102 St., New York 25.)

2–5. Research Equipment Exhibit and Symposium in Instrument Techniques and Applications, annual, National Institutes of Health, Bethesda, Md. (Supply Management Branch, NIH, Bethesda 14.)

4–5. American Psychosomatic Soc., 12th annual, Atlantic City, N.J. (L. S. Kubie, APS, 551 Madison Ave., New York 22.)

4–6. American Inst. of Electrical Engineers (Middle Eastern District), Columbus, Ohio. (N. S. Hibshem, AIEE, 33 W. 39 St., New York 18.)

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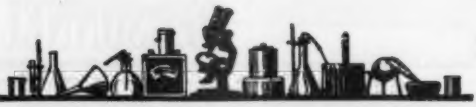

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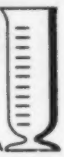

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N. Visconti of the Carnegie Institution of Washington at Cold Spring Harbor, discusses recombination of "genes" in viruses. J. Lederberg of Wisconsin and E. L. Tatum of Stanford review genetic evidence for "sex" in bacteria, and W. G. Hutchinson of Pennsylvania and H. Stempen of Jefferson Medical College describe cell fusions in certain bacteria. J. R. Raper offers a comprehensive coverage of sex in fungi.

R. Patrick of the Academy of Natural Sciences, Philadelphia, describes syngamy in diatoms; R. A. Lewin of the Maritime Regional Laboratory, Halifax, the sexuality of other unicellular algae, especially the flagellates.

In two chapters D. H. Wenrich covers sexual phenomena in some of the protozoa and discusses the origin and evolution of sex, based primarily on the protozoa, but including material about all of the microorganisms. D. L. Nanney of Michigan summarizes mating-type phenomena in *Paramecium aurelia* and some of the recent mating-type work from Sonneborn's laboratory. C. B. Metz of Florida State compares mating-type substances in *Paramecium* and other ciliates with those found in Metazoa. Extensive chapter bibliographies are included.

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